Westat

WIC ITFPS-2 Infant Report: Intention to Breastfeed

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At Westat, Beth Mittl played a key role in coordinating the instrument development and data management activities, and Brenda Sun, a statistical programmer, supported the analytic work; and Bibi Gollapudi managed the day-to-day recruitment activities.

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Study Overview 1

1.1 Background

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) was established to safeguard the health of low-income pregnant women and infants who are at nutritional risk. The program was established by Congress as a pilot in 1972 under Public Law 92-433, Section 17 to the Child Nutrition Act of 1966, and made permanent in 1974.[1] The program provides nutrition assistance to pregnant, postpartum, and breastfeeding women and their infants and children up to age 5. Participants must meet the income guidelines and have a household income at or below 185 percent of the Federal Poverty Level ($44,123 for a family of four in 2014) or be eligible based on participation in certain other mean-tested benefit programs. The Food and Nutrition Services (FNS) of the U.S. Department of Agriculture administers WIC, which is a Federal grant program, to State agencies (or tribal or territory agencies). The State agencies are responsible for program operations within their jurisdictions, and they provide services directly through government agencies, e.g. health departments or through contracts with local WIC-sponsoring agencies that provide services to WIC participants at local service sites or clinics.

The WIC Infant and Toddler Feeding Practices Study (WIC ITFPS-2) is a longitudinal study designed to measure the feeding practices employed by caregivers and the nutrition outcomes of children who participate in WIC. By capturing data on caregivers and their children over the first 3 years of the child's life, the study will inform a series of research questions regarding feeding practices, the effect of WIC services on those practices, and the health and nutrition outcomes of children on WIC. Additionally, the study will update past analyses to assess changes in behaviors and trends that may have occurred over the past 20 years—that is, since the last major study of the diets of infants and toddlers who were WIC participants.

The study is heavily predicated on the designs used for the 1997 Food and Consumer Service WIC Infant Feeding Practices Study (WIC IFPS-1) (Baydar et al., 1997) and the Food and Drug Administration's Infant Feeding Practices Study II (FDA IFPS-II) (Fein et al., 2008), which are the two best known longitudinal infant feeding practices studies over the past 20 years. Building on the

[1] http://www.fns.usda.gov/wic/about-wic-wics-mission.

past longitudinal work maximizes the comparability between current study data and past work, which facilitates assessing changes over time. The study also used aspects of the Gerber/Nestle Feeding Infants and Toddlers Studies (FITS) conducted in 2002 and 2008 to address nutrition and feeding practices of toddlers (Briefel et al., 2010; Ponza et al., 2004; Ziegler et al., 2006). Additionally, in revising the instrument, developers leveraged many of the approaches previously used, such as rotating question modules, to ensure study efficiency.

The seven primary objectives for the ITFPS-2 include:

- Update results of data collected in the 1997 WIC IFPS-1.
- Compare new findings with other major studies (WIC IFPS-1, FDA IFPS-II, and the FITS 2002 and 2008).
- Assess effectiveness of different education and breastfeeding promotion approaches in achieving recommended feeding patterns and behaviors.
- Assess conditions of overfeeding, overconsumption, underfeeding, and inappropriate feeding.
- Identify nutrition education influences.
- Assess impact of WIC food packages on outcomes.
- Determine change in maternal feeding practices and behaviors over time as infants and toddlers transition into or out of WIC.

The study was designed to meet the seven objectives as well as answer 60 research questions specified by FNS. These questions are listed in Appendix A.

1.2 Study Design

This observational study follows a hybrid design, incorporating a core longitudinal sample (the "core" sample) and a supplemental cross-sectional sample (the "supplemental" sample) to ensure precision in estimates at key points in time. The core longitudinal sample of women and their infants was enrolled in the study as they enrolled in WIC (either prenatally or before their infant is 2.5 months old if they did not enroll prenatally). The babies will be followed until they are 36 months old, with up to 13 maternal (or primary caregiver) interviews occurring prenatally, and at 1, 3, 5, 7, 9, 11, 13, 15, 18, 24, 30, and 36 months. The supplemental cross-sectional sample was also recruited as the women and their infants enrolled in WIC. This sample will be interviewed at four

key time periods (1 or 3, 7, 13, 24, 30, and 36 months). In order to be eligible for the longitudinal interviews, participants must complete a baseline module of demographic characteristics that is administered at the prenatal, 1-month, or 3-month interviews. This report on intention to breastfeed uses data from the prenatal interview.

Observational studies are well suited to social programs such as WIC for which random assignment is not feasible. The direct observation of individuals in their natural setting will capture the multiple effects of participation in WIC. However, as an observational study, it should be noted that it is impossible to definitively attribute causality. We hypothesize relationships and the analyses infer causality based on the correlations between variables; but causality cannot be explicitly established.

1.3 Sample Selection

The goal of the WIC ITFPS-2 is to collect data from a representative sample of participants who were enrolled in WIC prior to 3 months of age. This includes both those enrolled while the mother was pregnant and those who were first enrolled as infants. To obtain a representative sample of WIC participants, first a sample of WIC sites was selected, and then a sample of participants enrolling in WIC at each of the selected WIC sites was selected. A summary of the sampling plan is given below and further details of these procedures are provided in Appendix B.

1.3.1 Sampling WIC Sites

The WIC sites were selected using a stratified two-stage sampling approach. Because no national list of service sites exists, a summary file at the level of the unit reported by each State Agency (SA) in the census of April 2010 (the WIC Program and Participant Characteristics 2010, or PC2010) was used as the sampling frame. This census resulted in a file with one record for each participant being served by WIC in that month. Because SAs had flexibility for how they reported service location identifiers for PC2010, the IDs provided in the records varied; some provided the service site ID in addition to a local agency code, while others included only a local agency code. As a result, two stages of selection were used to sample sites. The first stage involved the sampling of "PC2010 tabulation units"—the units for which IDs were provided in the PC2010 data. The second stage involved the sampling of sites for situations in which the sampled tabulation unit was a local agency.

The sample was stratified to improve the precision of survey estimates. To achieve this goal, the strata were formed in such a way that the units within the strata were more similar to each other (in terms of characteristics related to key survey outcomes) than units in general (i.e., strata should be internally *homogeneous*). Five characteristics of the first-stage sampling unit or its SA were used to group the sites into a total of 40 strata for selection. The first three of these five characteristics are actually features of the WIC State Agency Plan and were included because they may be associated with key survey outcomes related to breastfeeding and nutrition. The characteristics included:

- **Peer Counseling Program.** Whether the SA has a breastfeeding peer counseling program in place.[2]
- **Trained Paraprofessionals.** Whether SA policy allows for trained paraprofessionals to provide nutrition education (versus requiring that staff members that provide nutrition education have professional training or credentials).
- **Policy to Provide Formula.** Whether SA policy permits providing one can of formula for breastfeeding infants during the first 30 days of life.
- **Percent of Women Who Used the Fully Breastfeeding Package.** The PC2010 data were used to measure food-package selection by first-stage sampling unit, and this rate was computed by taking the ratio of the number of postpartum women who received the fully breastfeeding package during April of 2010 to the total number of postpartum women receiving any food package that same month.
- **Average of Children's and Mothers' High Weight for Height Rates.** The PC2010 data were used to estimate the percent of children and the percent of mothers who are "high weight for height"[3] at the first-stage sampling unit level, and these percentages were averaged together to get a measure of risk of being overweight for all participants at the first-stage sampling unit level.

Within each stratum, two sites were sampled with probabilities proportional to size, where the measure of size was the expected number of eligible enrollees. Thus, a total of 80 WIC sites were sampled.

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[2] It turned out that there was no variation in this characteristic; all states reported offering a breastfeeding peer counseling program.

[3] For children (12 months or older), "high weight for height" is determined based on nutrition risk code 110 (see http://www.fns.usda.gov/sites/default/files/WICPC2010.pdf). For children 24 months and older, it is defined as higher than the 95th percentile of BMI for age. For children 12 to 24 months, it is defined as at risk of being overweight by virtue of having a mother or father who is obese (BMI of 30 or greater). For mothers, the criterion is a pregravid BMI of 25 or higher.

1.3.2 Sampling WIC Enrollees

We sampled new WIC participants who enrolled at the sampled sites during a pre-specified time period deemed the "recruitment window." Specifically, we included in the sample all new women enrolling in WIC for the first time for either their current pregnancy or their newborn at the site during the "recruitment window."[4] The recruitment window was a consecutive string of days during the study recruitment period in which all new WIC enrollees in that site were screened for eligibility and recruited into ITFPS-2. The length of the recruitment window for each site was pre-determined based on the estimated amount of time needed to yield 98 eligible new WIC enrollees per site (the target sample size for each site)[5]. The start date for the recruitment window was randomly assigned to each site. Because the flow of new WIC enrollees into the 80 sites varied substantially, the window length was much shorter in sites with a "high flow" of new enrollees compared to sites with a "low-flow." The study participants must have enrolled in WIC at the site during the recruitment period, although the study screening and enrollment could occur at a later date.

Core and Supplemental Samples. Two samples were selected at each service site: a core longitudinal and supplemental cross-sectional sample. The core sample was originally designed to be an equal probability sample of all new enrollees. The supplemental sample was designed to focus on subpopulations with specific characteristics such as African American mothers and infants enrolled postnatally with no prenatal WIC exposure. During the study recruitment period, changes were made to the approach for assigning cases to the core and supplemental samples, as well as to subsampling cases for the supplemental sample, which are discussed in more detail in Appendix B. For some interviews, both the core and supplemental sample (combined) are interviewed; for other interviews, only the core sample is interviewed.

Multiple Births. For those WIC mothers who had multiple births such as twins, a single infant was sampled at the first postnatal interview.

[4] Women who had enrolled in WIC for previous pregnancies and/or enrolled other children in WIC were eligible for the study. Women below the age of 16, those who did not speak English or Spanish, and those enrolling a child over 2.5 months of age were not eligible for the study.

[5] Estimated amount of time needed to yield 98 new WIC enrollees was based on July 2012 enrollment figures from the sites.

1.4 Data Sources

During the 4-year data collection period that began in July 2013,[6] the study will be collecting data from numerous sources. The main source is a series of followup telephone interviews with the mother. Other key information such as child's weight and length is being obtained periodically from WIC administrative records or health care providers; and contextual information about the WIC sites and State policies was obtained from clinic and WIC program staff.[7] The data sources include:

- Screening and enrollment interviews with recruited WIC enrollees;
- Telephone followup interviews with study participants conducted prenatally and when their babies are 1, 3, 5, 7, 9, 11, 13, 15, 18, 24, 30, and 36 months of age;
- WIC administrative records or health care providers for height and weight measures when the babies are born and at 6, 12, 24, and 36 months of age;
- WIC administrative records for WIC food packages provided to mothers and babies;
- Site visits to participating WIC sites and key informant interviews that profile local policies and practices; and
- A WIC site staff survey that collects information on local WIC programs and the training and experience of the staff.

Table 1-1 presents an overview of the information being obtained from each data source. Key content areas include background characteristics, knowledge, and lifestyle; feeding practices and experiences; childrearing practices; and weight and length outcomes.

[6] Westat will collect data over a 4-year period, but the length of time a mother will be a participant is dependent on when she was recruited. Mothers recruited when they were 1 month pregnant will be participants for 3.8 years, whereas mothers enrolled when their baby was 2.5 months old will be in the study for about 2.8 years.

[7] Information about the WIC sites will be used as covariates in exploring the variation in feeding practices. Only site-level data on modes of nutrition education delivery are available for this study; no data are available on the mode of nutrition education received by individual study participants.

Table 1-1. Data sources by topics covered

Domain	Screening/ enrollment	WIC participant survey interview													WIC Admin. data	Staff survey/ key informant interviews
		Baseline[a]	Prenatal	1 month	3 months	5 months	7 months	9 months	11 months	13 months	15 months	18 months	24 months	30 months	36 months	
Socio-demographic and background characteristics	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
WIC site characteristics and policies																✓
WIC program awareness and utilization			✓		✓		✓			✓			✓			
Maternal Health and lifestyle	✓	✓		✓	✓		✓			✓			✓	✓		
Feeding experience, knowledge, attitudes, beliefs, information, advice		✓	✓	✓	✓	✓	✓			✓	✓		✓	✓		
Hospital feeding related practices				✓												
Current feeding practices				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
24-Hour dietary recall				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	
Child health behavior/rearing practices				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		
Child weight and length															✓	
WIC food package type															✓	
Contact updates			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	
New caregiver characteristics				*	*	*	*	*	*	*	*	*	*	*	*	

[a] Baseline module questions are asked at the first interview (could be prenatal, 1 month, or 3 month).
* These questions are asked anytime someone permanently replaces the mother as the primary caregiver.

1.5 Data Collection Procedures

The study is using multiple modes of data collection to obtain the necessary information to support the study objectives. WIC mothers were recruited in-person at WIC sites, and are administered regular followup interviews by telephone. In addition, we periodically submit requests to State Agencies for data on the mother and child from WIC administrative records. We also collected data from WIC site staff using a web survey, and from State and local agencies staff using a mix of in-person and telephone interviews.

1.5.1 Recruiting WIC Participants

Recruitment activities were rolled out over a 9-week period in the 80 sampled sites, starting July 1, 2013 and ending November 18, 2013. Each site was assigned a recruitment window with the length of the recruitment window determined by the flow of new enrollees in the site. The target for each site was to sample 98 women and enroll in the study an average of 55 to 56 respondents per site during the recruitment window.

In all but three of the 80 sites, an on-site Westat field recruiter was responsible for screening and enrolling eligible participants into the study.[8] To be eligible for the study, the participant needed to speak English or Spanish, be at least 16 years of age, and enroll in WIC for the first time for her current pregnancy or enroll a new baby less than 3 months old. WIC staff certifying new WIC enrollees identified eligible study participants. The on-site recruiter explained the study to the potential study participant, who was randomly assigned as a candidate for either the core or supplemental group. The recruiter then completed a computerized screener to verify study eligibility, obtained written informed consent, and conducted a computerized 10-minute enrollment interview. If interested participants could not stay to be enrolled on site, the recruiter followed up by telephone and conducted the screener and enrollment interview over the phone. All participants were given a $50 incentive for enrolling in the study and subsequently $20 for each completed interview.

A total of 6,775 WIC participants were referred to the study across the 80 sites and 4,367 were enrolled. Table 1-2 shows the disposition status of all participants referred. Study eligibility was undetermined for 987 referred participants, 816 refused to complete the referral form or screener, and 171 left the WIC site before completing the screener and could not be reached by telephone.

Table 1-2. Status of all referred participants

Total referred	Eligible	Enrolled	Ineligible	Eligibility undetermined
6,775	4,489	4,367	1,299	987

[8] In 3 sites, WIC staff identified eligible women and sent their contact information to Westat; Westat interviewers recruited the women by telephone.

1.5.2 Interviewing WIC Participants

We are conducting followup interviews with WIC participants over a 4-year period which began in July 2013 and ends in July 2017. Study participants assigned to the core sample are interviewed more frequently than those in the supplemental sample. As shown in Table 1-3, WIC participants in the core sample enrolled prenatally are contacted to be interviewed 13 times over approximately a 3-year period, and women enrolled in WIC after giving birth participate in 11 or 12 interviews (depending on the age of their child when they enroll). If their baby is less than 6 weeks old, they start with the 1-month interview; however, if their baby is between 6 weeks and 2.5 months old, they start with the 3-month interview. In the supplemental sample, women either receive a 1-month or a 3-month interview, but not both. Those who enrolled prenatally or before their child was 6 weeks old receive a 1-month interview, whereas those enrolled after the baby is 6 weeks old receive a 3-month interview. All supplemental sample women are interviewed at three additional time points.

Table 1-3. Frequency of interviews for core and supplemental samples

Status of pregnancy at time of WIC enrollment	Interview schedule													Total
	Prenatal	1 month	3 months	5 months	7 months	9 months	11 months	13 months	15 months	18 months	24 months	30 months	36 months	
Core sample														
Prenatal	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	13
Infant <6 weeks		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	12
Infant 6 weeks-2.5 months			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	11
Supplemental Sample														
Prenatal		✓			✓			✓			✓	✓	✓	6
Infant <6 weeks		✓			✓			✓			✓	✓	✓	6
Infant 6 weeks-2.5 months			✓		✓			✓			✓	✓	✓	6

The telephone interviews are conducted in English or Spanish. All post-birth interviews except the 30-month interview include a 24-hour dietary recall using the Automated Multi-Pass Method (AMPM). Participants receive a package of measuring guides to help them report their child's portion sizes during the interview. We will collect replicate intakes on a 10 percent subsample of toddlers at 13, 15, 18, 24, and 36 months to estimate "usual" intake.

The prenatal interviews were all completed within 60 days of enrollment. The followup interviews are scheduled based on the child's birthday and start 14 days before the child turns 1 month old, 3 months old, etc. Because women may enroll in WIC at any stage in their pregnancy and many

participants were recruited when the baby was already born, the length of time each followup interview is in the field is about 15 months.

1.5.3 Collecting WIC Administrative Data

Periodically the study requests food package information and weight/length measurements from WIC administrative data. We collect maternal food package information at enrollment, and 1 and 6 months; child food package information at enrollment and 1, 6, 12, and 24 months; and weight and length measures of infants and toddlers at birth, 6 months, 12 months, 24 months, and 36 months. As part of regular clinic visits at these ages, WIC sites collect these data for most enrolled participants and report the information to the State. For participants who are in the core sample and have left WIC, we attempt to collect weight and length information from the child's health care provider. For those who do not have a health care provider, we arrange for a local home health agency to obtain weight and length measurements.

1.5.4 Conducting Site Visits and Key informant Interviews

To characterize the policies and services of the sites, an onsite visit was conducted by Westat's partner, Altarum, to each of the 80 sites between June and November 2013. The visits included observation of service delivery and a 1-hour key informant interview with the site supervisor or coordinator and others identified by the State or site. Additional interviews were also conducted with one or more staff of each of the 27 State agencies by telephone. The interviews covered staff qualifications and training, nutrition education, breastfeeding support, and food package choices and policies. The State WIC Director determined the appropriate staff member(s) for the State Agency interviews.

1.5.5 Conducting WIC Staff Survey

To obtain detailed information about staff qualifications that may affect how services are delivered, Altarum conducted a web survey between July and December 2013 to collect information from WIC staff members who were working in the study sites during the time period when participants were being recruited for the study. The online survey covered staff demographic characteristics and education, WIC training, beliefs about WIC program impacts and influences on infant and toddler

feeding practices, nutrition and breastfeeding education, materials, recommendations, and staff health behaviors. All staff members at each of the 80 study sites were asked to complete a survey. A total of 802 staff completed the survey and surveys were received from all 80 sites.

1.6 Weighting and Imputation

The data are weighted to support national estimates. The data are weighted to support national estimates. The weights inflate the sample to represent the population and compensate for both the unequal sampling rates and nonresponse. For ITFPS-2 the sample is weighted to represent the national population of infants enrolled in WIC for the first time either while the mother is pregnant, or postnatally before 3 months of age, whose mothers are at least 16 years old and speak either English or Spanish. All study findings are reported as percentages or proportions, and represent the characteristics, views, behaviors, and experiences of this population. Because the recruitment period for the study spanned 20 weeks, the weighted number of cases shown in the report tables is an estimate of the number of infants in the represented population who enrolled nationally during that 20-week period, rather than an estimate of the monthly or annualized total number of WIC participants nationally, and should not be used as such.

The complex sample design also affects variance estimation. We provide replicate weights that facilitate accurately estimating the variances given the sample design. Additionally, although almost all study participants have answered all the questions regarding key socio-demographic characteristics, there are few cases of item nonresponse for these variables. As these variables are used repeatedly in the analysis, we have imputed the missing socio-demographic information. Appendix B offers additional detail on weighting and imputation.

1.7 Sample Characteristics

As shown in Table 1-4, a total of 4,489 new WIC enrollees were eligible to participate in the study and of those, 4,367 (97 percent) were enrolled. To date, 3,658 (84 percent) have completed at least 50 percent of the core baseline module questions and are therefore eligible to continue in the study and are included in the analysis sample. (The analysis sample size will not be final until all participants have had the opportunity to complete the 3-month interview).

Table 1-4. Study sample participation (As of 2/3/2014)

Sample	Eligible sample (screened and eligible)	Enrolled sample (consented and enrolled)	Percentage of enrolled sample used for analysis (count)
Total Sample	4,489	4,367	83.8% (3,658)
Core Sample	3,605	3,503	91.8% (3,217)
Prenatal Core Sample	3,122	3,037	87.2% (2,649)
Postnatal Core Sample	483	466	91.2% (425)
Supplemental Sample	884	864	51.0% (441)
Prenatal Supplemental Sample	688	678	40.3% (273)
Postnatal Supplemental Sample	196	186	90.3% (168)

Because women were both recruited into the study and have their babies over a long time window, their interviews are occurring at different times. Table 1-5 shows the percentage of the analysis sample that has completed the group of interviews as of February 2014. The interviewing process is ongoing and therefore these percentages will rise significantly as the study progresses.

Table 1-5. Counts and percentage of respondents that completed interviews by sample type and interview month (Interview counts as of 2/3/2014)

Interview	Percentage of the analysis sample that completed the interviews		
	Total combined sample (N=3658)	Core sample (N=3217)	Supplemental sample[a] (N=441)
Prenatal	72.4% (2,649)	82.3% (2,649)	N/A
Month 1[b]	45.1% (1,648)	39.4% (1,266)	86.6% (382)
Month 3[b]	23.4% (856)	24.8% (797)	13.4% (59)
Month 5[b]	10.2% (374)	11.6% (374)	0.0% (0)
Month 7[b]	3.3% (121)	2.1% (68)	12.0% (53)

[a] Supplemental sample is interviewed at either 1 month or 3 months, but not both.
[b] These numbers will not be final until after all the interviews for this month are complete.

Table 1-6 provides a summary of the socio-demographic characteristics of the analysis sample as of February 2014. The data in this table are preliminary and based on the 3,658 women who have completed a baseline interview. As the analysis sample is not yet final, this number will increase. Additionally, the socio-demographic variables have not yet been imputed for the entire sample, thus, there are cases of item nonresponse so the counts do not all sum to 3,658. Finally, the ten variables in the table represent a subset of 23 socio-demographic variables that will be used in analyses over the course of WIC ITFPS-2. Data on the remaining 13 socio-demographic variables are not sufficiently complete to report because they relate to the birth or feeding of the child and at the time of this report many sampled mothers had not given birth.

Ultimately, the socio-demographic variables in Table 1-6 will serve as key analytical variables and the study will examine outcomes of interest among these subgroups. Of the 3,658 mothers with near complete socio-demographic information (first column of Table 1-6), the majority are white (59 percent), unmarried (70 percent), at or below the 75 percent of poverty threshold (63 percent), report their families to be at high or marginal food security (52 percent), and had no history of breastfeeding (54 percent). Approximately one-quarter (25 percent) are African American and almost 40 percent are of Hispanic or Latino ethnicity. Almost half (45 percent) considered themselves normal weight or underweight while only 28 percent were obese. Most of the women enrolled in WIC in their 1st or 2nd trimester. In addition, only a small number (about 16 percent) enrolled their baby in WIC postnatally. For about 40 percent of women, enrollment in WIC was for their first child. More than 83 percent of women participate in other nutrition assistance programs (such as the Supplemental Nutrition Assistant Program (SNAP), Temporary Assistance for Needy Families (TANF), the Child and Adult Care Food Program (CACFP), and the National School Lunch Program (NSLP)) and 48 percent receive SNAP benefits.

Table 1-6. Socio-demographic characteristics of analysis sample (As of 2/3/2014 and data up to the 3-month interview)

Socio-demographic characteristics	Percentage of analysis sample (count)
Race of Mother/Caregiver	
African American	24.8% (881)
White	59.4 (2,115)
All Other	15.8 (563)
Ethnicity of Mother/Caregiver	
Hispanic or Latino	38.8 (1,414)
Not Hispanic or Latino	61.2 (2,234)
Maternal Marital Status	
Married	30.5 (1,110)
Not married (including divorced and widowed)	69.5 (2,535)
Food Security (measured using 6-item module)	
High or Marginal Food Security	51.5 (1,781)
Low Food Security	31.4 (1,085)
Very Low Food Security	17.1 (592)
Participation in non-WIC Programs	
Does not participate in other programs	16.7 (595)
Participates in SNAP or in SNAP and other programs	48.3 (1,724)
Participates in Other Programs Excluding SNAP	35.0 (1,247)
Birth Order	
First born	40.8 (1,480)
Second born	27.4 (996)
Third or subsequent born	31.8 (1,153)
Timing of WIC Enrollment	
1st trimester	28.6 (1,046)
2nd trimester	38.6 (1,411)
3rd trimester	16.9 (620)
Postnatal	15.9 (581)
Weight Status of Mother Before Pregnancy	
Normal or underweight	45.4 (1,614)
Overweight	26.5 (943)
Obese	28.0 (996)
Poverty Level	
75% of poverty threshold or below	62.7 (2,173)
Above 75% but ≤ 130% of poverty threshold	27.4 (948)
Above 130% of poverty threshold	9.9 (343)
Breastfeeding History	
No history	54.0 (1,954)
Three or less months	21.9 (791)
More than three months	24.2 (874)

Data source: Interview questions SD2, SD3, SD4, SD14, SD15, SD18, SD19, SD21, SD31, SD36-40, SD42, MH1, MH2, MH29, KA2, KA6, KA31, HF22, HF23, HF26, HF28, WC5, and WC7-11

1.8 Analysis

We are conducting both descriptive and causal analyses to answer the 60 research questions posed by FNS as well as supplementary questions. Many of the research questions can be answered by descriptive analyses that tabulate the responses to specific interview questions; however, a subset focus on understanding the underlying population and program factors that drive nutritional and weight outcomes. We estimate behavior models to answer these types of questions. Additionally, we repeat most of the past analyses from the FNS-sponsored WIC IFPS-1 and the two Gerber/Nestle Feeding Infants and Toddlers Studies (FITS). We compare current findings to relevant past work and to current objectives and standards.

1.8.1 Descriptive Analyses

We use descriptive statistics (e.g., counts, proportions, means, medians, and cross-tabulations) to examine outcomes by subgroups of interest. We analyze the measures of interest by a standard set of 23 socio-demographic variables shown previously in Table 1-6, and then compare the subgroups to determine if the differences between them are statistically significant.

As many of these socio-demographic variables measure similar concepts, we explored the pairwise correlations between them using our prenatal analysis sample of 2,649 women based on chi-square tests of independence[9] as shown in Table 1-7. Ethnicity, marital status, and participation in non-WIC benefit programs are significantly correlated with the greatest number (six) of socio-demographic variables used in this study. This suggests that many of these socio-demographic variables are strongly related and may be measuring the same phenomenon.

[9] Chi-square tests were appropriately adjusted for our complex sample design. Statistical significance is at the 95- percent level.

Table 1-7. Correlated socio-demographic variables

	Race	Ethnicity	Marital status	Food security	Non-WIC benefits	Parity	Timing of WIC enroll.	Weight before pregnancy	Breastfeeding history	Poverty level
Race		✓	✓		✓				✓	
Ethnicity	✓			✓	✓		✓		✓	✓
Marital status	✓				✓	✓	✓		✓	✓
Food Security		✓			✓			✓		✓
Non-WIC Benefits	✓	✓	✓	✓		✓			✓	✓
Parity			✓		✓			✓		
Timing of WIC Enrollment		✓	✓					✓		
Weight before pregnancy				✓		✓	✓		✓	
Breastfeeding history	✓	✓	✓		✓			✓		
Poverty level		✓	✓	✓	✓					

Data source: Interview questions SD2, SD3, SD4, SD14, SD15, SD18, SD19, SD21, SD36 - 40, MH1, MH2, MH29, KA2, and KA6.

1.8.2 Behavioral Models

For the subset of the research questions that focus on identifying the causal relationships that drive the outcomes and decisions observed, we use multivariate analyses such as regression analysis to explore how choices and characteristics impact nutrition and weight outcomes while holding other contributing factors constant. We estimate models for intention to breastfeed, breastfeeding initiation, duration, and cessation, time until introduction of variations foods, and weight for length using weighted data.

1.8.3 Statistical Tests

The majority of analyses for this report involve cross-tabulations of topical variables by one or more key socio-demographic variables. We conducted significance tests on the cross-tabs to determine whether the variable of interest is associated with the socio-demographic variable. When the variable of interest is a proportion, a chi-square test, appropriately adjusted for our complex sample design, was used to determine if observed differences were statistically significant or more likely the result of random sampling error. If the variable of interest is a mean, we used a t-test, also adjusted for our complex sample design, to determine whether the differences were statistically significant. We employed the Bonferroni correction method for comparing multiple means. For the models, we use

replication methods to estimate the sampling errors of estimators, based on our complex sample design.

1.8.4 Missing Item Data

Item nonresponse is reflected in the total number of observations available for analysis. Responses of "Don't know" were typically considered item nonresponse and were, therefore, treated as missing for the purposes of analysis. The one exception involves statements of belief or intention. In such cases, the response of "Don't know" was included as a valid response.

Missing responses for key socio-demographic variables were imputed. Any difference in sample sizes between interview questions is attributable to item nonresponse for variables of interest that were not one of the 23 socio-demographic variables.

Prenatal Views on Breastfeeding 2

2.1 Overview

This chapter focuses on beliefs about the benefits of and barriers to breastfeeding, and explores intent to breastfeed among women who join WIC prenatally. Intentions to breastfeed differ from beliefs in that intentions reflect a psychological commitment toward the activity rather than a perception about the activity. Specifically, the analyses in this chapter address the following research questions:

- Do WIC mothers intend to breastfeed?
- Does the practice/behavior of women (intention to breastfeed) correspond to specific past feeding experiences (cultural norms, support received, personal feelings, barriers encountered, etc.)?

The work highlights findings that differ from the previous study, WIC IFPS-1, and explores the relationship between beliefs and intent. Because breastfeeding beliefs and intentions can vary substantially with individuals' background characteristics, in addition to the main analyses exploring the research questions, Appendix A of this chapter presents each variable of interest crossed by key socio-demographic variables. This appendix serves as a reference for answering how the results for each of the analyses differ for different subgroups of prenatal WIC participants.

For most mothers in WIC ITFPS-2 who joined WIC prenatally, the prenatal interview was their first full interview of the study. Many of these mothers are new to WIC and, therefore, may have very limited exposure to the program (44.2% of WIC ITFPS-2 mothers indicated on the prenatal interview that they had no prior WIC experience). The interview sought information on: (1) the participants' knowledge of WIC benefits, including specifics about the food packages; (2) the participants' perceptions of WIC services, including nutrition education and breastfeeding education and support; (3) whom participants turn to for advice; and (4) participants' attitudes toward breastfeeding and their infant feeding intentions. The prenatal interview was kept purposefully short as it was most women's introduction to the study interviews. Some important background and circumstance information, such as whether the women are working during pregnancy or will return to work post-birth, was deferred to the 1- and 3-month interviews. Consequently, analyses in

subsequent reports exploring correlates of actual breastfeeding initiation will include rich information about employment and other factors that may affect the decision to initiate and continue breastfeeding. Similarly, at this stage of analysis, we have only very general information on WIC clinics. We explore the variation in WIC program delivery in subsequent interviews and through a WIC staff survey. Future analyses will incorporate more detailed information about staff credentials and programs offered by WIC site.

2.2 Background

Behavioral intention is a complex interplay of environment and cultural context, attitudes about the value of a goal, and belief in one's own ability to achieve the desired goal. According to the *theory of planned behavior* (Ajzen, 1991), the pathway to a behavioral goal begins with beliefs. These beliefs include: personal views on the desirability of the behavior; whether the behavior is valued both by those close to the individual and by the individual's social and cultural group; and self-efficacy, or the ability of the individual to carry out the behavior effectively.

Applying these concepts to the intention to breastfeed, there are several key factors that are expected to influence women's breastfeeding decisions. First, women's backgrounds affect their personal beliefs regarding the benefits of and barriers to breastfeeding. Consultation with trusted sources and trends within their cultural or ethnic groups contribute additionally to their evaluation of the value of breastfeeding. Past experience with breastfeeding guides further beliefs about the feasibility of breastfeeding. Together, these beliefs coalesce into intentions about initiating and maintaining breastfeeding.

2.2.1 Breastfeeding Decisions

Attitudes, Beliefs, and Knowledge. Previous research has shown that breastfeeding decisions are particularly influenced by personal beliefs related to breastfeeding self-efficacy, perceived personal strength and ability, and comfort level with breastfeeding in public (de Jager et al., 2013). Past work has grouped beliefs about breastfeeding into perceived benefits of and barriers to breastfeeding and sought to examine their importance. Studies found that benefits are positively associated, and barriers are negatively associated, with initiation and duration of breastfeeding (Baydar et al., 1997; McCann et al., 2007). Research on low-income women in Tennessee explored barriers to breastfeeding and found that beliefs and concerns about breastfeeding in public, pain associated

with breastfeeding, and fear of harming the baby were among the most commonly perceived barriers (Ware et al., 2013). Concerns about breastfeeding in public and worries about pain were echoed as barriers by low-income African American women in Baltimore, Maryland (Bentley et al., 2003).

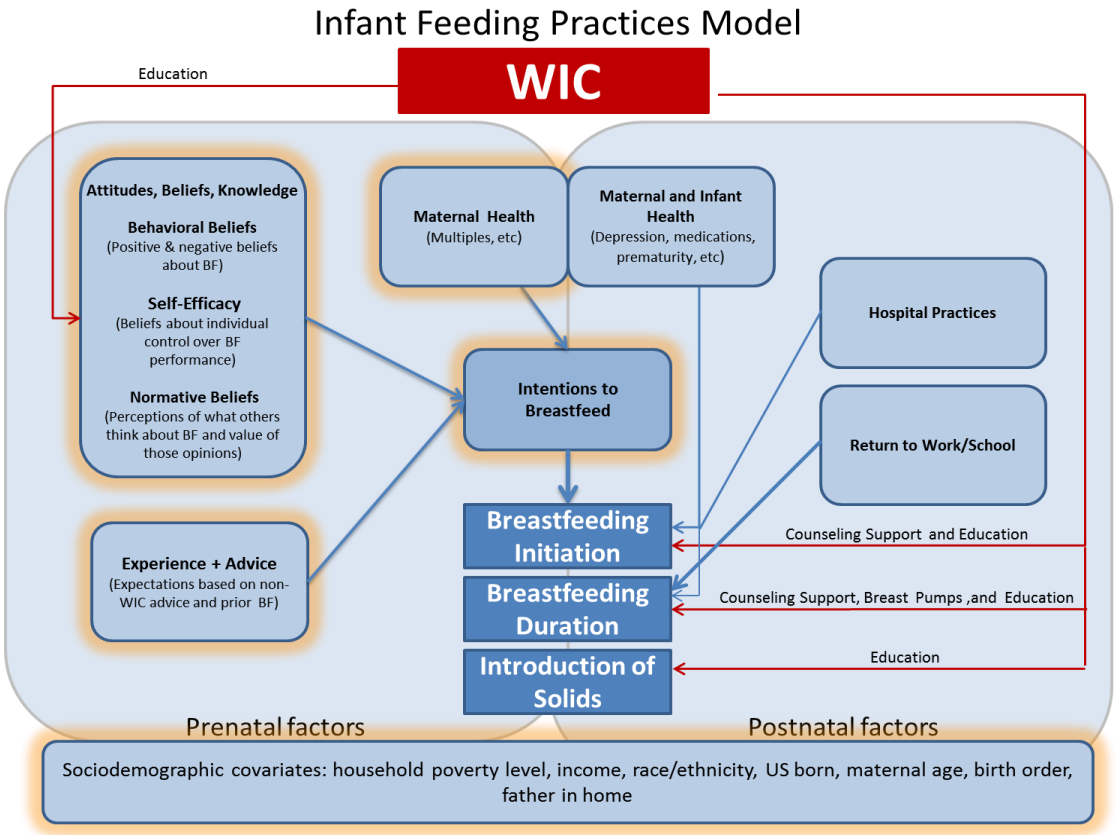
Cultural and social network influences on breastfeeding decisions have been explored as well. Race and ethnicity were found to be related to beliefs about breastfeeding, with greater proportions of Hispanic mothers generally agreeing with the statements associated with the benefits of breastfeeding than non-Hispanic mothers and greater proportions of African American mothers generally agreeing with the barriers to breastfeeding (Baydar et al., 1997; McCann et al., 2007). Though differences in initiation and duration between racial and ethnic groups are statistically significant (Grummer-Strawn et al., 2006; Christopher, 2012), these characteristics may be proxies for unmeasured cultural influences (Gibson et al., 2005; Simmie, 2006; Street and Lewallen, 2013). Nativity status may play similar role, as research on low-income women found that foreign-born women were more likely to report intentions to breastfeed than their native-born counterparts (Lee et al., 2005).

Experience and Advice. The influence of family and friends has also been shown to play a significant role in breastfeeding decisions (Baranowski et al., 1983; McLorg and Bryant, 1989; Bentley et al., 2003), with views of husbands and partners emerging as particularly important (Bentley et al., 1999; Arora et al., 2000; Wolfberg et al., 2004). Prior breastfeeding experience was a key factor found to be associated with increased intent to breastfeed among WIC-certified women in Mississippi (Mitra et al., 2004).

To help guide the analyses on breastfeeding beliefs and intentions, the authors developed a conceptual model of infant feeding practices as shown in Figure 2-1. This conceptual model incorporates theory and the findings from the literature and hypothesizes that prenatal maternal beliefs are established first and, in turn, along with current advice and experiences and maternal health, influence intentions to breastfeed. The components that are highlighted in gold are the relationships explored in this chapter.

The presentation in this chapter parallels the conceptual model, with beliefs, experience, and advice, discussed first, and then intentions. The influence of family and friends and program awareness among prenatal WIC recipients and whether beliefs about breastfeeding have changed since the previous study (WIC IFPS-1) in the 1990s are also examined. Finally, we investigate how beliefs influence intentions.

Figure 2-1. Conceptual infant feeding practice model



2.3 The Prenatal Sample

The prenatal sample consists of women who joined WIC prenatally and completed the prenatal interview that was administered to the core sample. There are 2,649 women in the core prenatal analysis sample.[10] These observations are weighted to reflect the prenatal WIC population.

Women who join WIC prenatally may differ from those who join WIC postnatally. As the first interviews with postnatal women are still occurring, we have not yet developed weights for women who join WIC postnatally to support population level estimates for this group. However, preliminary examination of the unweighted sample data suggests that those who join prenatally may more likely be Hispanic, unmarried, and expecting their first child. Other key socio-demographic variables exhibit little difference. These preliminary differences will be further explored when we have sufficient data on the postnatal sample.

[10] Only the core prenatal sample gets the prenatal interview.

2.4 Prenatal Beliefs Regarding Breastfeeding

To explore beliefs about breastfeeding, our inquiry parallels some of the analyses that were conducted in WIC IFPS-1, which examined a series of breastfeeding belief statements and determined how these beliefs were thematically related. WIC IFPS-1 assessed 30 similar breastfeeding belief statements. After reviewing their findings, we excluded from data collection statements that were endorsed by few respondents so as to minimize the burden on our participants. We kept a subset of 13 of their statements and added a new statement regarding breastfeeding's influence on the child becoming overweight. Using a 5-point Likert scale, respondents could "strongly agree," "agree," "neither agree nor disagree," "disagree," or "strongly disagree" with each statement. Analysis of the data seeks to confirm that the responses can be distilled, as they were 17 years ago in WIC IFPS-1, into two conceptual summary measures: the perceived benefits of breastfeeding and the perceived barriers to breastfeeding. We also examined how responses vary by race, ethnicity, and education (with Appendix C showing the variation by additional socio-demographic variables).

2.4.1 Benefits and Barrier Groupings

We ran confirmatory factor analysis on the belief statements to determine whether our data fit the perceived benefits and perceived barriers model used in the WIC IFPS-1. Factor analysis is a data reduction method in which correlated observed variables are grouped together and separated from other variables with low or no correlation. The grouped variables are attributed to an unobserved thematic concept (a factor). We assessed measures of model fit and internal consistency reliability to determine whether belief statements were consistent with the benefits of and barriers to breastfeeding constructs.[11]

The items determined to be perceived benefits in the WIC IFPS-1 study continue to resonate as a cohesive group of statements with current prenatal WIC women. The perceived benefit statements measured the same construct, and based on Cronbach's alpha, the items were internally reliable.[12]

[11]Factor loadings were required to be >=0.4; We relied also on the comparative fix index (CFI), the goodness of fit index (GFI), the root mean square error of approximation (RMSEA), and the standardized room mean square error (SRMR). CFI=0.88; GFI=0.96; RMSEA=0.057; and SRMR=0.55.

[12]Cronbach's alpha was 0.75.

In contrast, some of the statements previously found to be barriers by the WIC IFPS-1 study are no longer perceived that way. In fact, two of the items previously incorporated in the perceived barriers model no longer fit well within the barrier concept.[13] The two statements are "Breastfeeding means no one else can feed your baby" and "With bottle feeding, the mother knows that the baby is getting enough to eat." Excluding these two statements, we examined internal consistency of the remaining items and found that it is, at best, only marginally acceptable.[14] The correlations among the perceived barrier items are low. Although all the statements represent barriers to breastfeeding, it is unlikely that they all measure the same underlying thematic construct.

Table 2-1 lists the belief statements analyzed. The items are ordered by their statistical importance within the perceived benefits and perceived barriers models.[15] Those that are statistically most important among the perceived benefits are the health benefits associated with breastfeeding. The new statement regarding breastfeeding's impact on child obesity is an item within the benefit factor but is the least important contributor. The two items associated with perceived inconvenience of breastfeeding are the most important items among perceived barriers. The two statements highlighted in gray and italicized are those that no longer resonate well as barriers.

Table 2-1. Items that constitute the perceived benefits of and barriers to breastfeeding

Perceived benefits of breastfeeding	Perceived barriers to breastfeeding
Breastfed babies are healthier than formula-fed babies.	Breastfeeding ties you down.
Breastfeeding helps protect baby from diseases.	Breastfeeding takes too much time.
Breastfeeding is easier than formula feeding.	Breastfeeding in public is not something that I want to do.
Breastfeeding brings a mother closer to her baby.	Breastmilk leaking into your clothes is something that I worry about.
Breastfeeding helps women lose weight.	Breastfeeding is painful.
Breastmilk alone gives a new baby all he/she needs to eat.	*No longer resonate as barriers:* *Breastfeeding means no one else can feed your baby.*
Breastfeeding reduces the risk of a child becoming overweight.	*With bottle feeding, the mother knows that the baby is getting enough to eat.*

Data source: Prenatal interview questions KA18a-n.
The items are ordered by their statistical importance within the perceived benefits and perceived barriers models.

[13]Factor loadings were less than 0.4.

[14]Cronbach's alpha equaled 0.58.

[15]The magnitude of factor loading determined statistical importance.

2.4.2 Change in Attitudes Over Time

Comparisons of the findings with those from WIC IFPS-1 reveal substantial changes in attitudes about breastfeeding over time as shown in Table 2-2. The data from the two studies differ somewhat in that WIC IFPS-1 data are based on responses from women who had just delivered their babies and their three response categories are less nuanced than our five categories. To make the data comparable, we grouped our "strongly agree" and "agree" responses and present data on the percentages of women who agree with the statements regarding the benefits of and barriers to breastfeeding. Because WIC IFPS-1 provided limited descriptive statistics, we do not have all the information needed to statistically test whether the proportions from the two studies are different. However, given the large differences between the proportions over time, one can be confident that these reflect true shifts in thinking of WIC mothers.

Table 2-2. Comparisons of percentages of WIC mothers agreeing with statements about the benefits of and barriers to breastfeeding

Maternal attitudes and beliefs	WIC ITFPS-2	WIC IFPS-1
	Percentage of mothers agreeing with statement	
Benefits of Breastfeeding		
Breastfed babies are healthier than formula-fed babies.	79.7	61
Breastfeeding helps protect the baby from diseases.	81.2	77
Breastfeeding is easier than formula feeding.	55.3	50
Breastfeeding brings a mother closer to her baby.	87.9	81
Breastmilk alone gives a new baby all he/she needs to eat.	71.3	71
Breastfeeding reduces the risk of a child becoming overweight.	50.0	Not asked
Breastfeeding helps women lose weight.	74.5	53
Barriers to Breastfeeding		
Breastfeeding ties you down.	17.3	41
Breastfeeding takes too much time.	14.7	34
Breastmilk leaking onto your clothes is something that I worry about.	27.4	46
Breastfeeding in public is not something that I want to do.	36.9	61
Breastfeeding is painful.	43.6	39
Breastfeeding means no one else can feed your baby.	50.8	48
With bottle feeding, the mother knows that the baby is getting enough to eat.	67.0	76
Unwgt n	2,649	Not reported
Wgt n	395,398	Not reported

Data source: Prenatal interview questions KA18a-n.
Data from WIC IFPS-1 were only available to one decimal place.
Italicized items no longer resonate as barriers within the perceived barriers model.

As Table 2-2 shows, overall views regarding breastfeeding have shifted to being more positive. Higher percentages of women agree with six of seven benefits statements and lower percentages agree with five of seven barrier statements. There has been about a 20 percentage point increase in those affirming that "Breastfed babies are healthier" and "Breastfeeding helps women lose weight".

In terms of barriers, only 17 percent of women affirm the belief that breastfeeding ties you down, which is a drop from 41 percent in WIC IFPS-1. Similarly, there has been a 19 percentage point decrease in both the percentages of women affirming "Breastfeeding takes too much time" and "Breastmilk leaking onto their clothes is something they worry about." Finally, the largest difference is in affirmative responses to "Breastfeeding in public is not something that I want to do," with currently 37 percent of women affirming this statement as compared with 61 percent in 1997. This dramatic change may reflect modern legislation that now legally protects women who choose to breastfeed in public.

Revisiting the WIC IFPS-1 perceived benefits and barriers models reveals that there have been dramatic changes in the attitudes of WIC prenatal mothers regarding breastfeeding. To give some context for how large these changes in attitudes have been, we compare the changes in beliefs among WIC women to the national trends in Table 2-3. To the extent possible, we matched similar belief statements from the CDC Health Styles survey to the ITFP-1 and 2 surveys. Additionally, because the CDC Health Styles survey asks different questions across years, the time period of the two data series do not always match and extrapolation was needed to make them comparable. The table, therefore, displays the percentages affirming a given survey item in the first and last year of data collection, the percentage point difference over the data collection period (e.g., 1999 to 2007), and the adjusted difference when the trend is extrapolated cover the entire period from 1994 to 2013.

As Table 2-3 shows, the change in views was greater for WIC women as compared to the national sample of all women for all 4 matched pairs of belief statements. In 3 of the 4 belief pairings, the change in WIC women's attitudes outpaced the national change by more than 10 percentage points. The strongest evidence that WIC women's attitudes have changed more than the national trend comes from the third question that is basically the same across the surveys and asks if one agrees with the statement that breastfeeding is healthier for babies than formula feeding. The national data that there has been 9.2 percentage point increase in women agreeing with this statement in 2013 than did in 1994 while amongst WIC women the increase is 18.7 percentage points.

Table 2-3. Changes in beliefs about breastfeeding amongst all women compared to WIC women adjusted to reflect between 1994 and 2013

Belief statements	Percentage of women agreeing with statement			
	Year		Difference	Adj. difference[a]
All women:[b] Feeding a baby formula instead of breast milk increases the chances the baby will get sick.	2013 24.6%	1999 21.7%	2.9	3.9
WIC women:[c] Breastfeeding helps protect the baby from diseases.	2013 81.2	1994 77.0	4.2	4.2
All women: A mother who breastfeeds has to give up too many lifestyle habits like favorite foods, cigarette smoking, and drinking alcohol.	2010 48.2	2000 44.6	3.6	6.8
WIC women: Breastfeeding ties you down.	2013 17.3	1994 41.0	23.7	23.7
All women: Breastfeeding is healthier for babies than formula feeding.	2010 72.9	1999 67.6	5.3	9.2
WIC women: Breastfed babies are healthier than formula-fed babies.	2013 79.7	1994 61.0	18.7	18.7
All women: I am comfortable when mothers breastfeed their babies near me in a public place, such as a shopping center, bus station, etc.	2007 44.1	1999 49.9	5.8	13.8
WIC women: Breastfeeding in public is not something I want to do.	2013 36.9	1994 61	24.1	24.1

[a] Adjusted using straight line extrapolation to reflect the 19 year trend between ITFP-1 (1994 data collection) and ITFP-2 (2013 data collection for prenatal interview).
[b] Data on the breastfeeding beliefs of all women are from the CDC Health Styles survey, http://www.cdc.gov/breastfeeding/data/healthstyles_survey/survey_2013.htm.
[c] Data on WIC women are from ITFP-1 for 1994 and the current study for 2013.

Not surprisingly, these changes in WIC women' attitudes occurred over a time period in which WIC made substantial changes to further encourage breastfeeding. For example in 1994, P.L. 103-448 raised the minimum amount spent per woman on WIC Breastfeeding promotion and support. Similarly, in 1998, P.L. 105-336 authorized WIC State agencies to use food funds, in addition to nutrition services administrative funds, for the purchase or rental of breast pumps. Breastfeeding peer counseling has been steadily growing since its antecedents in the mid-1990's and began being funded via grants from FNS in 2004. The 2007 Interim WIC Food Package Rule and 2014 Final WIC Food Package Rule Food increased the quantities and variety of foods in the packages for exclusively breastfeeding mothers and infants and reduced the amount of formula provided to infants who are partially or solely formula fed. Finally , the Healthy Hunger Free Kids Act of 2010 (P.L. 111-296) put further emphasis on encouraging breastfeeding through increased staff training and an award program to recognize WIC local agencies that demonstrate exemplary breastfeeding promotion and support activities.

2.4.3 Attitudes Toward Perceived Benefits

Table 2-4 displays the percentage of prenatal WIC mothers agreeing with perceived benefits items overall and by mother's race, ethnicity, and education, as these socio-demographic characteristics can be proxies for cultural influences that shape beliefs, such as, the influence of family and friends, formal and informal role models, and traditions.

Benefits
Overall: >50 percent agree with each benefit statement.
Race: African Americans least positive.
Ethnicity: Hispanics most positive.
Education: Those with less education, generally less positive.

Overall. The majority of WIC prenatal mothers agree with the statements that breastfeeding helps the baby be healthy, helps protect the baby from diseases, and brings the mother and baby closer together getting the greatest endorsements. Nearly 75 percent agree with the statement that breastfeeding helps a woman lose weight, and only a slightly lower percentage agree that breastmilk gives a baby all that he or she needs to eat. Just over half of the mothers agree with the statement that breastfeeding is easier, whereas 50 percent agree with the statement that breastfeeding reduces the likelihood of the child becoming overweight, the one belief statement added since the WIC IFPS-1.

Race. Looking at the data by race, African American mothers affirm the benefit statements in the lowest proportions whereas mothers in the all other races category affirm the benefit statements in the highest proportions. Testing whether race affected the responses, the Chi-square test for equal proportions revealed that the percentages among the different racial categories were significantly different for the first four statements. Additional pairwise testing revealed that significantly lower proportions of African American mothers affirm the statements about breastfeeding protecting the baby from diseases, bringing a mother closer to her baby, and being easier than formula feeding as compared with both white and other-race mothers.

Ethnicity. Analysis of the data by ethnicity reveals that higher percentages of Hispanic mothers affirm each of the statements than do their non-Hispanic counterparts. All of these differences are statistically significant. This finding is consistent with WIC IFPS-1, which found that Hispanic women more favorably regarded the benefits of breastfeeding.

Table 2-4. Percentage of prenatal mothers agreeing with statements about the perceived benefits of breastfeeding by race, ethnicity, and education

Maternal attitudes and beliefs	All prenatal mothers	Percentage of prenatal mothers agreeing with the statement						
		Race			Ethnicity		Education	
		African American	White	All other	Hispanic	Non-Hispanic	High school or less	More than high school
Breastfed babies are healthier than formula-fed babies.[bc]	79.7%	75.4	78.8	86.3	88.5	71.8	80.3	78.5
Breastfeeding helps protect the baby from diseases.[bcd]	81.2	74.0	82.4	85.0	87.9	75.2	79.1	84.8
Breastfeeding is easier than formula feeding.[bcd]	55.3	47.2	53.4	68.6	68.5	43.5	59.2	48.1
Breastfeeding brings mother closer to baby.[bc]	87.9	84.0	88.4	90.3	92.8	83.5	87.8	88.0
Breastmilk alone gives new baby all he/she needs to eat.[c]	71.3	66.9	71.5	74.9	78.0	65.3	70.9	71.7
Breastfeeding reduces the risk of a child becoming overweight.[c]	50.0	45.0	51.3	51.3	58.0	42.8	48.9	51.5
Breastfeeding helps women lose weight.[cd]	74.5	73.8	74.4	75.3	78.6	70.7	72.1	78.5
Unwgt n[a]	2,649	582	1,606	461	1,089	1,560	1,682	959
Wgt n	395,398	82,231	230,878	82,289	186,511	208,887	251,367	142,794

[a] n is the number of respondents to the last question in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of race differences is significant at $p \leq 0.05$.
[c] Chi-square statistic testing of ethnicity differences is significant at $p \leq 0.05$.
[d] Chi-square statistic testing of education level of mother or caregiver differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18a-f, KA18n, and SD26. Screener questions SD2 and SD3.

Education. Three of the perceived benefit statements exhibit variation in response by education level. A statistically significantly higher proportion of prenatal mothers with more than a high school education affirm that breastfeeding helps protect babies from disease and that it helps mothers lose weight. However, a statistically significantly lower proportion of prenatal mothers with more than a high school education perceive that breastfeeding is easier than formula.

Race and Ethnicity Over Time. As shown in Appendix D, responses by all racial and ethnic subgroups are uniformly more positive now than they were 19 years ago, with more women agreeing with all the benefit statements. Additionally, the relative positions by race and ethnicity regarding

benefits remain generally unchanged, with Hispanic women the most positive, followed by women in the "All other races" category, then whites, and then African Americans.

2.4.4 Attitudes Toward Perceived Barriers

Table 2-5 displays the percentages of WIC prenatal mothers agreeing with the perceived barrier items overall and by race, ethnicity, and education. For presentation purposes, we include the two items that no longer fit well with the barriers construct. They are italicized to distinguish them.

Barriers
Overall: <50 percent agree with most barrier statements.
Race: No strong pattern.
Ethnicity: No strong pattern.
Education: Those with less education generally more negative.

Overall. The range in the percentages of women agreeing with barrier statements is wider than that for benefits, suggesting that there are disparate views regarding barriers. Less than 20 percent of prenatal mothers agree with the statements that "Breastfeeding ties you down" or "Breastfeeding takes too much time," whereas more than 50 percent of women agree with the statements that "Breastfeeding means no one else can feed your baby" and "With bottle feeding, the mother knows the baby is getting enough to eat."

Table 2-5. Percentage of prenatal mothers agreeing with statements about the perceived barriers to breastfeeding by race, ethnicity, and education

Maternal attitudes and beliefs	All prenatal mothers	Percentage of prenatal mothers agreeing with the statement						
		Race			Ethnicity		Education	
		African American	White	All other	Hispanic	Non-Hispanic	High school or less	More than high school
Breastfeeding ties you down.[c]	17.3%	18.2	17.5	16.1	15.3	19.1	17.5	17.2
Breastfeeding takes too much time.[c]	14.7	15.6	13.8	16.4	17.3	12.4	14.7	14.7
Breastfeeding in public is not something I want to do.[d]	36.9	39.2	35.7	38.2	35.1	38.6	40.0	31.6
Breastmilk leaking onto your clothes is something I worry about.[bcd]	27.4	34.4	25.2	26.6	23.4	31.0	29.2	24.0
Breastfeeding is painful.[bcd]	43.6	44.4	41.1	49.6	45.6	41.8	44.2	42.1
Breastfeeding means no one else can feed your baby.[bcd]	*50.8*	*55.4*	*45.6*	*60.7*	*60.3*	*42.3*	*59.1*	*35.8*
With bottle feeding, the mother knows that the baby is getting enough to eat.[cd]	*67.0*	*65.0*	*68.1*	*66.1*	*63.6*	*70.1*	*68.7*	*63.8*
Unwgt n[a]	2,649	582	1,606	461	1,089	1,560	1,682	959
Wgt n	395,398	82,231	230,878	82,289	186,511	208,887	251,367	142,794

[a] n is the number of respondents to the last question in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of race differences is significant at $p \leq 0.05$.
[c] Chi-square statistic testing of ethnicity differences is significant at $p \leq 0.05$.
[d] Chi-square statistic testing of education differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18g-m, SD26. Screener questions SD2 and SD3.
Italicized items no longer fit well in the perceived barriers model.

Race. Statistical testing reveals that responses to statements about leaking, pain, and no one else can feed the baby differ by race. However, pairwise testing shows that the influence of race on perceived barriers does not follow a consistent pattern; instead, it varies by the type of barrier. A statistically significantly higher proportion of African American prenatal mothers worry about breastmilk leaking into their clothing than do white mothers or mothers in the all other races category. The proportion of white mothers agreeing with the statement that "Breastfeeding is painful." was statistically significantly lower than the proportion of mothers in the "All other races" category, but the proportion of African American mothers agreeing with this statement was not statistically significantly different from the proportion in the two other racial categories. For the barrier that no one else can feed the baby, only white mothers have statistically significantly different responses, with a lower proportion agreeing compared with African American mothers or mothers from the "All other races" category.

Ethnicity. Statistical tests reveal that ethnicity significantly affects the percentage of women who agree with all the barrier statements except breastfeeding in public. However, unlike with benefits, the effect of ethnicity on one's attitudes regarding barriers is mixed. For some statements (e.g., no one else can feed your baby) a higher percentage of Hispanics agrees with the statements, whereas for other statements (e.g., breastfeeding ties you down) a lower percentage agrees with the statements relative to non-Hispanics.

Education. For all but the first two barrier statements, responses vary with education level. The percentages agreeing with the five remaining statements are significantly higher for those with less education, suggesting that agreement with barriers lessens with higher educational attainment.

Race and Ethnicity Over Time. As shown in Appendix D, responses by race and ethnicity have changed over time. Generally speaking, all racial subgroups see fewer barriers to breastfeeding than WIC IFPS-1 respondents did 19 years ago, with almost always a lower percentage of women agreeing with each barrier statement. Attitudes toward barriers by ethnicity have shifted over time, but generally these changes do not following a systematic pattern.

2.4.5 Composite Belief Measures by Race, Ethnicity, and Education

In addition to examining how responses to individual belief statements vary by demographic characteristics and have changed over time, the study team also explored how the overall concepts of benefits and barriers differ among the WIC subpopulations. This analysis involved distilling the

benefit and belief statements into two additive indices.[16] We assigned numeric values to each response as follows: strongly agree=5, agree=4, neither agree nor disagree=3, disagree=2, and strongly disagree=1. These values were summed, and the sum rescaled to 100.

Table 2-6 displays the mean scores for the belief indices by race, ethnicity, and education. A score of 100 indicates that the mother strongly agreed with all the statements. Mean scores for the benefits statements range from 75 to 80, indicating a relatively high number of women strongly agreeing with benefit statements. Mean scores for the barriers index range from 52 to 54, indicating mixed responses to barrier statements. These summary indices reveal patterns similar to those discussed previously for the individual benefit and belief statements. For the benefit index, virtually all the differences in means by race, ethnicity, and education are statistically significant. In contrast, for the barrier index, only the differences in the mean by education level are statistically significant.

Table 2-6. Mean composite benefit and barrier scores by race, ethnicity, and education

	Race			Ethnicity		Education	
Index	African American	White	All other	Hispanic	Non-Hispanic	High school or less	More than high school
Perceived Benefits Index[abc]	75.0	77.5	78.5	80.0	74.7	76.6	78.3
Perceived Barriers Index[c]	54.3	52.7	53.8	52.8	53.7	53.8	52.3
Unwtg n	582	1,606	461	1,089	1,560	1682	959
Wtg n	82,231	230,878	82,289	186,511	208,887	251,367	142,794

[a] Differences between African American and both white and other races are statistically significant. Differences between white and other races are not significantly different.
[b] Differences by ethnicity are statistically significant at $p \leq 0.05$
[c] Difference by education are statistically significant at $p \leq 0.05$
Data source: Prenatal interview questions KA18a-n and SD26. Screener questions SD2 and SD3.

[16] This follows the methodology used in WIC IFPS-1. That study subsequently uses the scale measures as predictors in multivariate model formula supplementation.

2.5 Experience and Advice About Infant Feeding and WIC Program Awareness

Research indicates that support and education are the factors influencing breastfeeding initiation and duration. The study examined whom WIC mothers talk to about the decision to breastfeed or formula feed, their awareness of the WIC program, and what WIC nutritional and educational services they have received.

2.5.1 Experience and Advice About Infant Feeding

Many WIC women have children already and therefore made breastfeeding decisions in the past. Specifically, 59 percent (not shown) of the prenatal women have previous children and, of those, 82 percent (not shown) had initiated breastfeeding with a past child. In total, 48 percent (.59*.82) of prenatal women had initiated breastfeeding with a previous child.

In addition to relying on their direct experience, many women seek advice about breastfeeding from others. The prenatal interview asked participants about conversations they may have had regarding their infant feeding plans, inquiring whether they spoke with a husband/boyfriend, mother, other relatives, friends, people at WIC, or their doctor. Not surprisingly, 78 percent (as shown in Appendix D) of women confer with their husband or boyfriend about this decision. Staff at WIC was the second most common group women speak to about breastfeeding, with 68 percent reporting they talked with WIC staff. Smaller percentages of women reported speaking to mothers (62 percent), doctors (51 percent), friends (40 percent), and other relatives (39 percent) about breastfeeding. Irrespective of whom women turn to, to discuss infant feeding plans, more than 80 percent of the women reported that the conversation was important to helping them make a decision.

2.5.2 WIC Awareness

Many study participants had limited WIC exposure at the time of the prenatal interview, as only those women enrolling in WIC for the first time for their current pregnancy were eligible to participate in the study and approximately 41 percent of the prenatal sample was expecting a first child. Within the prenatal sample only 55.7 percent of women indicated they had received WIC

benefits for a prior pregnancy or child. Nonetheless, the study explores prenatal women's knowledge of the WIC program policies, the exclusive breastfeeding package, and the amount of formula offered as well as whether they received breastfeeding and nutrition information and education from their WIC site. The WIC program promotes breastfeeding as the optimal infant feeding choice unless there are medical reasons contraindicating it.[17] The interview asked women who joined WIC prenatally whether they "think that WIC recommends breastfeeding only, formula feeding only, or that both are equally ok?" As Table 2-7 shows, 40 percent of the WIC prenatal population believes that WIC recommends breastfeeding only, whereas 58 percent believe that WIC recommends both breastfeeding and formula feeding equally. The majority of women are aware of the exclusive breastfeeding package but only about half know about how the quantity of formula varies with breastfeeding and the baby's age. Seventy-two percent of prenatal women say they received information on breastfeeding, whereas 92 percent report they received information on diet.

Table 2-7. WIC program awareness

WIC program awareness and utilization	Percentage of all prenatal mothers
Woman believes: WIC recommends	
Breastfeeding only	40.7
Formula feeding only	0.5
Both are equally ok	57.9
Don't Know	0.9
Exclusive breastfeeding package is offered at WIC clinic	
Yes	63.5
No	5.4
Don't Know	31.1
Amount of infant formula varies with age of baby	
Yes	49.1
No	8.0
Don't Know	42.9
Amount of infant formula varies with how much breastfeeding	
Yes	51.8
No	6.8
Don't Know	41.4
Woman reports receiving: Breastfeeding information	
Yes	71.7
No	27.8
Don't Know	0.5
Information on eating	
Yes	91.8
No	8.0
Don't Know	0.2
Unwgt n[a]	2,649
Wgt n	395,398

[a] n is the number of respondents to the last question in the table. For some questions, n is slightly different due to item nonresponse.
Data source: Prenatal interview questions WC1, WC2, WC3, WC4, WC5 and WC6.

[17] http://www.fns.usda.gov/wic/breastfeeding-promotion-and-support-wic

Investigation of this 20 percentage point disparity in the types of information received revealed that the intention to formula feed was not a factor in the information given but that having previous children and being in the first trimester of pregnancy both lowered the likelihood that a women received breastfeeding information. For very different reasons, both these groups may not be interested in breastfeeding information at their initial WIC visit. Although the percentage of women getting breastfeeding information varies with whether a woman has had previous children or is in her first trimester, the differences are not large enough to explain the overall disparity. The more important factor in determining if a woman gets information on breastfeeding appears to be her WIC site. At 13 of the 80 WIC sites participating in this study, more than 40 percent of study participants indicated that they did not receive breastfeeding information. At one site, 60 percent of women indicated that they did not receive the information. The variation suggests that WIC site characteristics or polices may be responsible for the disparity in types of information received. Pairwise testing revealed that sites located in states that allow only staff with college degrees and/or credentials (licensed practical nurse (LPN), registered nurse (RN), registered dietitian (RD), dietetic technician (DT)) to provide nutrition education had a greater proportion of women (11 percentage points higher) indicating that they received breastfeeding information.[18]

2.6 Intentions to Breastfeed

To measure breastfeeding intentions, the study team used the infant feeding intentions (IFI) scale based on the methodology put forward by Nommsen-Rivers et al. (2009), as their work is generalizable within low-income groups in the United States. We examined how intentions vary by socio-demographic characteristics within the WIC-participating prenatal population, and explored the relationship between beliefs and intentions.

Using the IFI scale, the interview asked respondents to indicate their levels of agreement using a standard 5-point Likert scale with the following five statements:

- I am planning to only formula feed my baby and do not plan to breastfeed at all.
- I am planning to breastfeed my baby or at least try.

[18]State policy requiring staff that provides nutrition education to have college degrees and/or credentials may influence the style or comprehensiveness of nutrition education interactions with participants; therefore, we use the policy variable as an approximate measure of state emphasis on comprehensive nutrition education.

- When my baby is 1 month old, I will be breastfeeding without using any formula or other milk.
- When my baby is 3 months old, I will be breastfeeding my baby without using any formula or other milk.
- When my baby is 6 months old, I will be breastfeeding my baby without using any formula or other milk.

Each response was assigned a value ranging from 0 to 4, with 4 being the most positive score for all but one question in which the scale is reversed. Responses were then summed to get the IFI scale, which ranges from 0 to 16, with higher scores indicating stronger intention to breastfeed. The mean IFI scale for the WIC prenatal population is 9.8. Nommsen-Rivers et al. (2009) found a mean score of 11.8 in their sample of low-income women who were pregnant with their first child. Similarly, looking only at those in the prenatal cohort who are pregnant with their first child, the mean IFI score rises to 10.2.

The study examined how the mean IFI score varies by socio-demographic subcategories, performing pairwise t-tests to determine whether differences between means are statistically significant.[19] We created a base group within each socio-demographic variable to which the other groups are compared. The base group is the socio-demographic subcategory with the highest frequency of responses. Table 2-8 presents the subgroup means and t-statistics. To facilitate reading the table, we highlight all the statically significant differences: cases in which the means are higher than the base case are highlighted in rose, whereas cases in which the means are lower than the base case are highlighted in blue.

Numerous socio-demographic variables, when examined separately, are associated with an individual's intent to breastfeed. Being Hispanic, married, participating in Federal programs other than SNAP, income relative to the poverty guidelines, having breastfed previously for more than 3 months, and educational attainment are all statistically significant factors that associated with higher intentions to breastfeed. In contrast, being African American, being pregnant with a second child, having been on WIC previously, not living with the baby's father, and engaging in discussions about infant feeding plans with no more than one person are statistically significant characteristics that are associated with lower mean intentions to breastfeed. One unexpected finding that differs from the literature is that the mother being born outside the United States does not influence the intention to breastfeed. It may be the case that the majority of women in our sample not born in the United States may have come here as children and have been acculturated.

[19]Appendix A presents the distribution of mean IFI scores by these key socio-demographic variables.

Table 2-8. Comparison mean infant feeding intention (IFI) index by socio-demographic factors

Socio-demographic	Mean	t-stat
Race		
African American[a]	9.2	-2.71
All Other	10.2	1.03
Base Group: White	9.9	-
Ethnicity		
Hispanic or Latino[a]	10.2	2.98
Base Group: Not Hispanic or Latino	9.5	-
Maternal Marital Status		
Married[a]	10.5	4.46
Base Group: Not married (including widowed or divorced)	9.5	-
Food Security (measured using 6-item module)		
Low Food Security	9.8	-0.23
Very Low Food Security	10.0	0.65
Base Group: High or Marginal Food Security	9.8	-
Participation in non-WIC benefit program(s)		
Participate in other programs excluding SNAP[a]	10.0	2.74
Does not participate in any other benefit programs[a]	10.7	5.87
Base Group: Participates in SNAP or in SNAP and other programs	9.4	-
Parity		
Second born	9.6	-2.35
Third or subsequent born[a]	9.5	-3.17
Base Group: First born	10.2	-
Timing of WIC Enrollment		
1st trimester	10.2	1.97
3rd trimester	9.2	-1.97
Base Group: 2nd trimester	9.8	-
Weight Status of Mother before Pregnancy		
Obese	9.9	0.66
Overweight	9.9	0.87
Base Group: Normal or underweight	9.7	-
Poverty Level		
Above 75% but no more than 130% of poverty guideline[a]	10.2	3.18
Above 130% of poverty guideline[a]	10.5	3.08
Base Group: 75% of poverty threshold or below	9.6	-
Breastfeeding History		
Three or less months	9.2	-1.26
More than three months[a]	11.0	6.66
Base Group: No History	9.5	-
Education		
More than High School[a]	10.5	5.78
Base Group: High School or Less	9.4	-
Born in US		
Mother is not born in US	10.0	1.48
Base Group: Mother is born in US	9.7	-
Prior WIC Receipt		
Has received benefits from WIC for 3 or more years in total[a]	9.5	-2.72
Has received benefits from WIC for up to 2 years in total[a]	9.6	-2.54
Base Group: Never received benefits from WIC before this pregnancy	10.2	-
Mother living with father of the baby		
Mother not living with father of the baby[a]	9.2	-4.97
Base Group: Mother living with father of the baby	10.3	-
Conversations about infant feeding plans		
Spoke with one person or none[a]	8.5	-5.68
Base Group: Spoke with two or more people	10.0	-

[a] Mean is significantly different from base group mean at $p \leq 0.05$.

Data Source: Prenatal interview questions KA1, KA2, KA19a-e, SD14, SD15, SD18, SD21, SD36-40, and MH29. Screener questions SD2, SD3 and SD4. Log question 20.

Rose indicates mean is statistically significantly higher than base case. Blue indicates mean is significantly lower than the base case.

2.7 Multivariate Analysis of Beliefs and Intentions

Because breastfeeding intentions are influenced by a variety of socio-demographic characteristics that are themselves correlated, we used regression analysis to estimate the independent effect of these variables on intention. This analysis parsed out the effect of each explanatory variable while holding constant the effects of the others. Our conceptual model hypothesizes that beliefs influence intentions; therefore, the initial regression model regressed IFI on the belief indices constructed earlier and all the socio-demographic variables that were significantly correlated with mean IFI scores (see Table 2-8). These background variables are proxies for cultural influences, support systems, personal experiences, and education that influence infant feeding intentions. The regression model is a reduced form of the theory postulating a relationship between background characteristics, experiences, beliefs, and infant feeding intentions.

The initial regression model revealed that after including beliefs only a few of the socio-demographic variables remained significant predictors of IFI scale scores. This is not surprising, as we expect the impact of socio-demographic variables is through shaping beliefs rather than having a direct effect on intentions. Additionally, some of the measures, such as marital status and living with the father, are highly correlated and their effect was captured by one variable. We explored several variants of regression models consistent with our Infant Feeding Practices Model that used different combinations of socio-demographic variables. We eliminated the background characteristics that were significant individually but not significant in the multivariate context.[20] These were race, ethnicity, marital status, participation in non-WIC benefits, poverty level, and prior WIC receipt. For parsimony, we collapsed socio-demographic categories from three to two if all were significant in comparison to the base group in Table 2-9.

Table 2-9 displays the results of the final regression model. The model explains nearly 34 percent of the variability in IFI scores. The belief indices are highly significant and the sign on each coefficient is as expected: holding all else constant, the benefits index is positively correlated with increases in the IFI scale and the barrier index is negatively correlated with the IFI scale. Parity, breastfeeding history, education, and mother living with the father all have the expected signs. All else held constant—education, previous breastfeeding experience, mother living with the father, and speaking to multiple sources about infant feeding plans increase intentions to breastfeed, whereas having

[20] Although past studies indicate race is predictor of breastfeeding behavior, we found that once beliefs are controlled for, race is no longer significant. This held true for model specification with race alone and in conjunction with ethnicity.

previous children lowers the intention to breastfeed. The regression coefficients are reported in Appendix D.

Table 2-9. Signs and significant of coefficients of regression IFI scale on belief indices and socio-demographic variables

Explanatory variable	Coefficient sign	Significance
Perceived Benefit Index	Positive	Significant
Perceived Barrier Index	Negative	Significant
Parity: Second or subsequent born compared to first born	Negative	Significant
Breastfeeding History: Some history compared to no history	Positive	Significant
Education: More than high school compare to less than high school	Positive	Significant
Mother living with father of baby	Positive	Significant
Spoke with more than one person about infant feeding plans compared to one or less	Positive	Significant

Data source: Prenatal interview questions KA18, KA19a-e, KA22, SD15, KA1,KA2, KA6, SD26, and SD20.

2.8 Summary

There have been substantial changes in WIC prenatal mothers' perceptions of breastfeeding since the WIC IFPS-1. The perceived benefits and barrier model put forward in the past study remain robust for benefits as the benefit statements still appear to represent a thematic construct. However, the model is not robust for barrier statements, which no longer seem to represent a single concept. Women today are much more positive about breastfeeding than they were 17 years ago during the WIC IFPS-1. A higher percentage of women report agreeing with the benefits of breastfeeding and a much smaller percentage report agreeing with most barriers than in the past. Both the percentages of women affirming individual benefits statements as well as the overall benefit index score suggest that among racial/ethnic groups, Hispanics are the most positive about the benefits of breastfeeding and African American are the least positive. This relative ranking has remained unchanged since WIC IFPS-1. In contrast, the results on barriers suggest that these attitudes do not vary systematically with race, ethnicity, or education and that the changes over time do not follow a consistent pattern by these demographic variables.

The analysis of the intention to breastfeed reveals that a variety of socio-demographic factors are individually related to one's feeding intention. However, most of these socio-demographic variables appear to influence, or serve as proxies for, beliefs. After controlling for beliefs in the regression analysis, only a few socio-demographic variables continued to have a direct effect on a woman's

feeding intentions. The next chapter[21] addresses breastfeeding initiation, utilizing data from the 1-and 3-month interviews. These interviews provide a richer set of circumstance variables, allowing for more in-depth analyses of the factors that influence the decision to breastfeed.

[21]The next chapter is forthcoming.

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Appendix A
Study Research Questions

Table A-1. Study research questions

Study research questions
1: What is the participant's practice on breastfeeding and formula feeding her infant?
1a: Does the practice/behavior correspond to specific past feeding experiences (cultural norms, support received, personal feelings, barriers encountered, etc.)?
1b: How does breastfeeding advice or support compare to rates of initiation, duration, and exclusivity of breastfeeding?
1c: Are differences from one re-interview to the next statistically significant?
2: What is the frequency of breastfeeding or formula feedings and foods (total and by breast, formula, combinations, and foods) given?
2a: Do mothers/caregivers ever put anything other than human milk or formula in a bottle that is fed to their infant?
3: What is the mean and range in the incidence, duration, and intensity of breastfeeding? *Not collecting duration of individual breastfeeds*
3a: Are differences from one re-interview to another statistically significant?
4: What are the breastfeeding history characteristics of postpartum women by level (e.g., quintile) of mean incidence, duration, and intensity?
4a: Do these characteristics change from one interview to the next? If so, are the differences statistically significant?
5: How does the mother/ caregiver determine the daily feeding schedule for the infant?
5a: How does this vary by day of the week, work schedule, and other factors? Not collecting day of but rather typical pattern week
6: What are the feeding practices with pumping or expressing human milk?
6a: How does the mother/ caregiver determine these practices?
6b: How does this vary by day of the week, work schedule, healthcare support and other factors? Not collecting day of week
7: How does the mother/caregiver determine the specific time and duration of feeding?
8: What are mothers' reported breastfeeding problems?
8a: Among those who had common breastfeeding problems, what are the number and percent receiving help from the WIC staff?
9: What is the distribution of caregiver understanding of appropriate feeding behaviors associated with infants' nonverbal cues regarding satiety gestures and cry interpretations?
10: How are caregivers obtaining or preparing baby foods (e.g., making at home, buying, getting from WIC, etc.)?
11: How do caregivers' infant food choices vary across feedings (e.g., only human milk, only formula, mixture, alterations, or other drinks)?
11a: Is the caregiver supplementing with food and/or other beverages besides formula and breast milk (e.g., soda, tea, juice)?
11b: What is the percentage of combination feedings comparing human milk, formula, and/or foods (e.g., mom supplements in the evening to allow infant to sleep through the night being 90% human milk, 5% baby foods, and 5% formula per day)?
11c: How much food and/or cow's milk (i.e., whole, 2%, chocolate or 1% milk) is used?
12: What WIC Food Package is the caregiver/infant receiving (i.e., full breastfeeding or partial breastfeeding)?
13: What are the barriers (e.g., environmental) in breastfeeding practices and behaviors for infants?
13a: For those who identified barriers, what do they think would be the best possible solution to overcome the barriers?
14: What do mothers/caregivers perceive to be the impact of their food package choices on their breastfeeding behavior?

Table A-1. Study research questions (continued)

Study research questions
15: What do mothers/caregivers perceive to be the impact of their food package choices on the food their child receives?
16: What is the nutrient intake of infants and (if option funded) toddlers?
16a: How does the nutrient intake vary by State food package choices?
16b: How does the nutrient intake vary by age, primary milk source, and other factors?
17: What is the frequency and nature of mothers' reported breastfeeding problems?
17a: Did the mother receive support? For whom? If not, from whom would she have liked support (WIC, family, all the above, etc.)?
17b: Are there group differences in the prevalence of breastfeeding problems by race/ethnicity, age, and education of the mother?
17c: How does the frequency of breastfeeding problems vary with other actors?
17d: What are the resolutions of the problems?
18: At each age, what percentages of WIC infants and/or toddlers use a cup (with and without assistance), a spoon, a Sippy cup or a pacifier throughout the first years of life? What percentage of WIC infants self-feed during mealtimes? How does this vary by eating location (e.g., home, child care, away from home with primary caretaker)? Not collecting by location
19: How well are caregivers who use formula following the standard or specialized formula dilutions prescribed by the doctor or nutritionist? What is the prescribed amount, and is this over or under standard recommendations?
20: What is the frequency of methods used by the caregiver to prepare foods (such as pureeing or mashing with utensils or by chewing up foods then giving to child)?
21: When is pumping or expressing human milk done and how often? What are the storage practices? If using a breast pump, where did mother receive the pump from? What is the distribution of the frequency of use of pumps?
22: What non-program and program factors (i.e., supplies, policies, staff competencies, and actions) contribute to the likelihood of initiating breastfeeding, formula supplementation, baby foods, and cereals?
23: For women who chose a fully breastfeeding package yet also use formula, where do these women obtain formula?
24: If formula is used, what type(s) of formula (i.e., exempt, soy, milk-based, ready-to-drink powdered or concentrated)?
24a: Who provided formula?
24b: What was the reason for the formula?
24c: How do these factors change in relation to the age of the infant?
25: Does the mother or child have any medical conditions? If so, what were the actions taken to rectify? Are *only asking about treatments that could affect feeding behaviors (e.g., hospitalization, medication, etc.)*
26: If child ever used a pacifier, when was it introduced and who introduced it? For what reason was the pacifier introduced? How often is the pacifier used and are there specific times when it is used or not used? Not asking when pacifier was introduced or frequency of use or times used
27: What is the overall prevalence of breastfeeding problems over the first half of infancy? What is the distribution of type of problem? How does this change over time?
28: How do the feeding practices of infants and children who continue WIC participation compare to those who leave the program or have non-continuous periods of participation?
29: What is the first feeding of WIC infants in the hospital?
29a: Was the mother encouraged to initiate breastfeeding?
29b: Did mother initiate breastfeeding in the hospital?
29c: If so, how long after delivery was feeding initiated/encouraged (such as within the first hour after birth)?
29d: Did the infant receive anything other than human milk in the hospital? If so, what, when and how often?
30: What are mothers' reported breastfeeding problems while in the hospital? Among those who had common breastfeeding problems, what are the number and percent receiving help from the hospital staff?

Table A-1. Study research questions (continued)

Study research questions
31: Did the mother/caregiver report receiving various items such as formula, pacifiers, bottles, breast pump; perhaps as part of a give package from inside the hospital? What is the distribution of the content of these items? How does this relate to breastfeeding and other infant feeding practices?
32: Did the mother use any of the following services in the hospital: Media campaign materials, Lactation consultant, Other trained specialist, Breastfeeding support groups or classes, Equipment for breastfeeding support, Peer counseling, Other counseling, 24-hr. breastfeeding hotline, Designated staff members contact, Any other activities
33: Did the mother birth multiples? If yes - vaginally or cesarean section?
33a: Infants health status (such as height, weight, head circumference, blood tests, Apgar scoring, immunizations, amount of wet/soiled diapers, and food allergy)? Not collecting data on food allergies
34: When was mother discharged from hospital? Infant? How do these relate to infant feeding at discharge and later?
35: What was the type(s) of feeding at hospital discharge (e.g., breast, formula, or both)?
36: If applicable, what is the amount of expressed milk during the first 2 weeks after birth? What was done with the expressed milk? Interview occurs at 1 month and not at 2 weeks
37: What are the reasons why mothers stop breastfeeding during the first few weeks of their infant's life? How often do these occur? Which pose the greatest risk to breastfeeding success and duration?
38: What factors play into a mother being successful at breastfeeding her infant during the first few weeks of life and 4-6 months of life? What factors are associated with successful breastfeeding for the first 6 months of her infant's life?
39: What is the distribution of reasons for mothers coming into WIC clinics at 4-6 months and, in some cases, stopping breastfeeding?
40: What is the mother's Edinburgh Postpartum Depression Scale score? How does this relate to infant feeding practices?
41: How do the answers to all above listed research questions vary in relation to the infant's health status at birth (such as length, weight, etc.) and household demographic characteristics?
42: For working mothers, describe the distribution of characteristics of the place at work to pump human milk? Does the mother's employer have a workplace lactation program or provide any workplace accommodations (such as reasonable breaks, an appropriate place to store milk, a place other than the bathroom to pump/express human milk, etc.)?
43: Is the respondent's child participating in the CACFP? If yes, what is the transition of baby foods, table foods, cow's milk, and human milk in the CACFP and other facilities?
44: If applicable, when did the child go into a childcare facility and what kind (i.e., child care center, family day care homes, early Head Start, homeless shelters, etc.)?
45: For infants in child care: What are the general barriers to breastfeeding in these facilities? Who provides the food to these facilities? Is human milk given by bottle or nipple when at facilities (e.g., may go to facility on break to breastfeed or some mothers only bottle feed human milk to infants)? If the mother providing expressed human milk or breastfeeding the infant at the facility? How does breastfeeding success relate to childcare policies and practices?
46: What are the caregiver's socio-demographic characteristics (i.e., sex, birth order, age of mother at time of birth, U.S. citizen, marital status, household size, poverty level, receipt of public assistance, education, employment prior WIC, drug history, health care, Medicaid, etc.) by maternal race and ethnicity? What is the native language? Not including drug history or native language. Will use foreign born rather than citizenship.
47: What are the distributions of caregivers' and participants' health-related characteristics by race and ethnicity of the mother?
48: Is this the mother's first time breastfeeding or formula feeding?
49: Did the mother breastfeed siblings?
49a: If so, when did she initiate and how long did she breastfeed?
49b: When did she first give baby foods and table foods to siblings on WIC?

Table A-1. Study research questions (continued)

Study research questions
50: When did the mother/caregiver start participating in the WIC program?
51: What are mothers' influences to breastfeed or formula feed? What influences the mother to breastfeed or formula feed?
52: Does the mother intend to breastfeed?
53: Did the mother receive counseling on infant feeding and care and by whom?
53a: Where did the mother receive her counseling on infant feeding and care (e.g., clinical dietitian from hospital, nurse practitioner or WIC nutritionist clinic)?
54: What are staff and mothers/caregivers knowledge, attitudes, and beliefs about nutrition and behavior (e.g., following a kosher, vegan diet or other religious views affecting food consumption, etc.) for infants and toddlers?
55: What are the mothers'/caregivers' challenges in nutrition education involving feeding practices?
56: Where does the mother/caregiver get nutrition information (e.g., WIC, websites, social media, family, friends, social networks, healthcare providers, etc.)?
57: What triggers mothers'/caregivers' behavior to get information (such as infant won't stop crying, desire to be good mother, etc.)?
58: What are the physicians' views and/or beliefs regarding breastfeeding a preemie vs. non-preemie (e.g., growth)? Not interviewing providers. Instead, asking mother/caregiver their perception of their provider's views.
59: What is the relationship of infant and child feeding practices to infant and child growth and weight status (e.g., overweight/ underweight)?
60: What are the mothers/caregivers and child's health care providers (OBGYN, pediatrician, etc.) views or beliefs regarding breastfeeding? What recommendations have mothers/caregivers received from their health care providers regarding breastfeeding? Not interviewing providers. Instead asking mother/caregiver their perception of their provider's views. As such perception of views and recommendations merge.

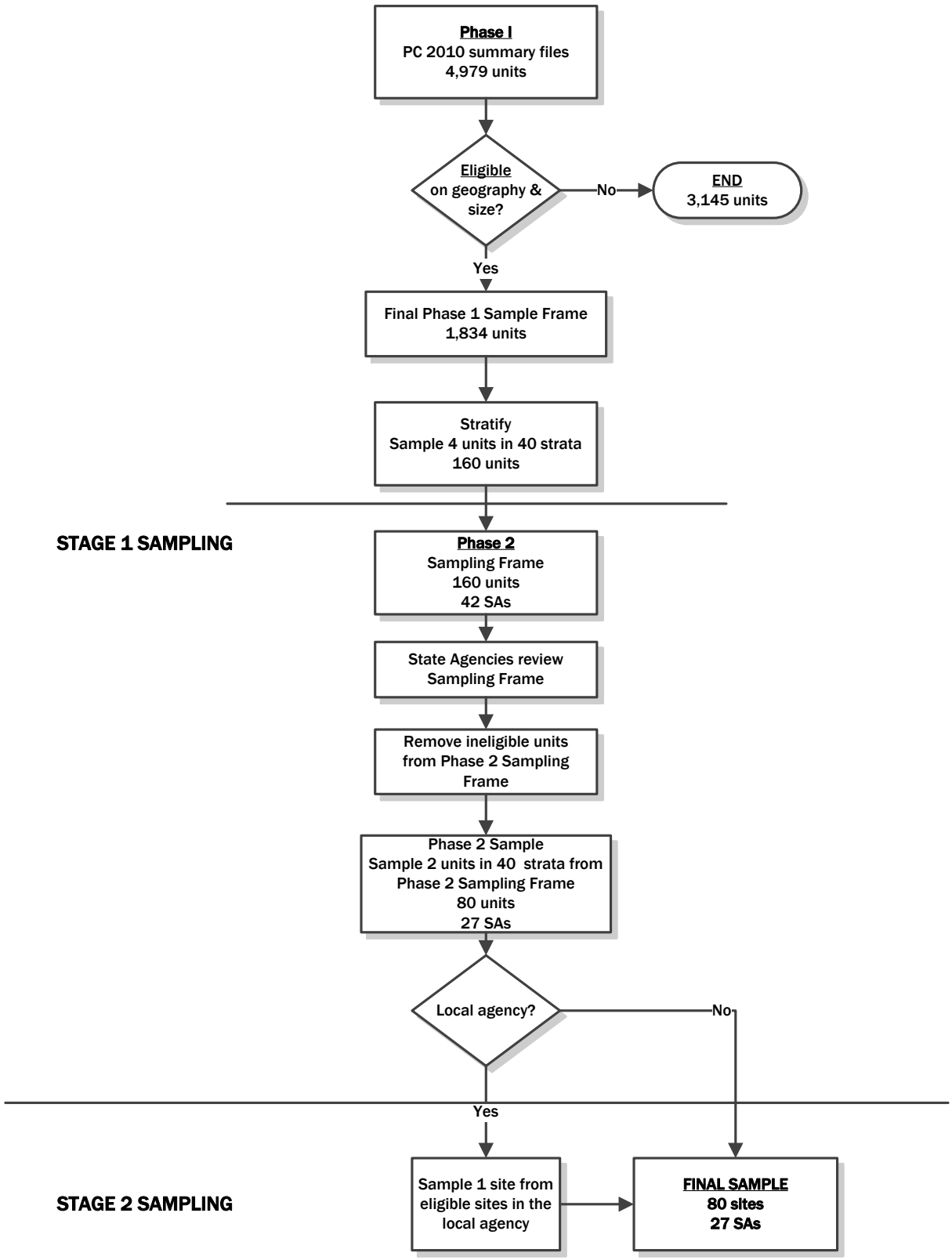
Appendix B
Details of Sampling and Weighting Procedures

B.1 Selection of WIC Sites

The WIC service sites were selected using a stratified two-stage sampling approach. Because no national list of service sites exists, we used, as a sampling frame, a summary file at the level of the unit reported by each State Agency (SA) in the census of April 2010 (the WIC Program and Participant Characteristics 2010, or PC2010). This census resulted in a file with one record for each participant being served by WIC in that month. Because State agencies had flexibility for PC2010 for reporting service location identifiers, the IDs provided in the records by the State agencies varied; some State agencies provided the site ID in addition to a local agency code, whereas other State agencies included only a local agency code. As a result, two stages of selection were used to sample sites. The first stage involved the sampling of "PC2010 tabulation units"—the units for which IDs were provided in the PC2010 data. The second stage involved the sampling of sites for situations in which the sampled tabulation unit was a local agency. (For the remainder of this report, these tabulation units will be referred to, using standard statistical terminology, as "first-stage" sampling units.) Additionally, because the information needed to determine final eligibility of sites (namely, current enrollment information and whether the site was expected to be operational during the study recruitment period) was not available in the PC2010 data, the first-stage sample was selected in two phases in order to contact State agencies to obtain additional eligibility information about the sites. The ultimate goal was the selection of 80 WIC sites. Figure B-1 is a flowchart that gives a general overview of the WIC site sampling process.

As shown in Figure B-1, Phase 1 of Stage 1 involved the selection of four first-stage sampling units in each of 40 strata to create a Phase 2 sampling frame of 160 units. Stratification involved partitioning the sampling frame into four homogeneous groups and was used to improve the precision of estimates and to ensure representation in the sample of different types of sites. In Phase 2 of Stage 1, we contacted State agencies to determine the eligibility of each of the units sampled in the first phase and then sampled two units from among the eligible first-stage sampling units in each stratum for a total of 80 units. In Stage 2 we sampled the services sites within the sampled units that were local agencies (rather than service sites) and selected one site from each local agency.

Figure B-1. Overview of WIC site sampling process



Site eligibility was defined in terms of enrollment flow. A minimum average flow of 1.5 new enrollees per day was required for a site to be eligible and ensure a sufficient volume of participants. Additionally, to ensure that recruitment could be completed within the study recruitment period, we imposed a restriction requiring that eligible sites yield the target number of eligible enrollees within a 4-month period.

Following the completion of the sampling of sites for the study, we began site recruitment efforts in earnest to eliminate the adverse effects of site-level nonresponse on sample yield, sampled service sites that were unable to participate in the study were replaced by members of a matched sample.

B.2 Construction of the Sampling Frame

The sampling frame was constructed from the WIC Program and Participant Characteristics 2010 (PC2010) dataset. PC2010 data were provided through a total of 90 individual SAS data files—one for each State WIC Agency. The PC2010 was obtained from FNS in October 2011. Once received, Westat's subcontractor, Altarum, merged all 90 files into a single analytic file. Altarum thoroughly reviewed the PC2010 Guidance document to better understand each field that is included in the PC2010 database and to identify fields that would be required to develop the first-stage sampling frame file, including the following variables that Altarum derived from information provided in the PC2010 database:

- Unit (i.e., a unique identifier for the PC2010 tabulation unit described in section B.1, which was either the WIC site or the local agency);
- Unit Source;
- Number of Exclusively Breastfeeding Women;
- Number of Postpartum Women, Not Breastfeeding;
- Number of Prenatal Women Enrolled in April 2010 (PC2010 reference month);
- Number of Infants Under Age 3 Months Enrolled in April 2010;
- Total Number of Infants Enrolled in April 2010;
- Percent of Infants Enrolled in April 2010 Who Were Under Age 3 Months;
- Total Number of Participants (all Categories);

- Number of Women Participants Under Age 18 Years in April 2010;
- Number of Women Participants Under Age 16 Years in April 2010;
- Percent of Women With High Weight for Height Risk Code; and
- Percent of Children With High Weight for Height Risk Code.

B.3 Stage 1 Sampling: Selection of the Phase 1 Sample

The Stage 1 sampling was conducted in two phases. The process used to select the Phase 1 sample involved three steps: computation of the measure of size (MOS) used for Phase 1 selection, exclusion of ineligible units, and stratification and selection of the units.

B.3.1 Measure of Size Computation

The sample design involved sampling sites with probabilities proportional to a measure of size (MOS) (i.e., PPS sampling). For the Phase 1 sample, the MOS was the expected number of eligible enrollees for the first-stage sampling unit, based on the April 2010 enrollment counts from the PC2010. That is, the MOS was calculated for each first-stage sampling unit by summing the total prenatal enrollment and 20 percent of the total enrollment of infants less than 3 months.[22] Based on the aforementioned eligibility considerations, units with a value less than 30 for this MOS (i.e., less than 1.5 enrollees per day, assuming 20 enrollment days per month) were considered ineligible.

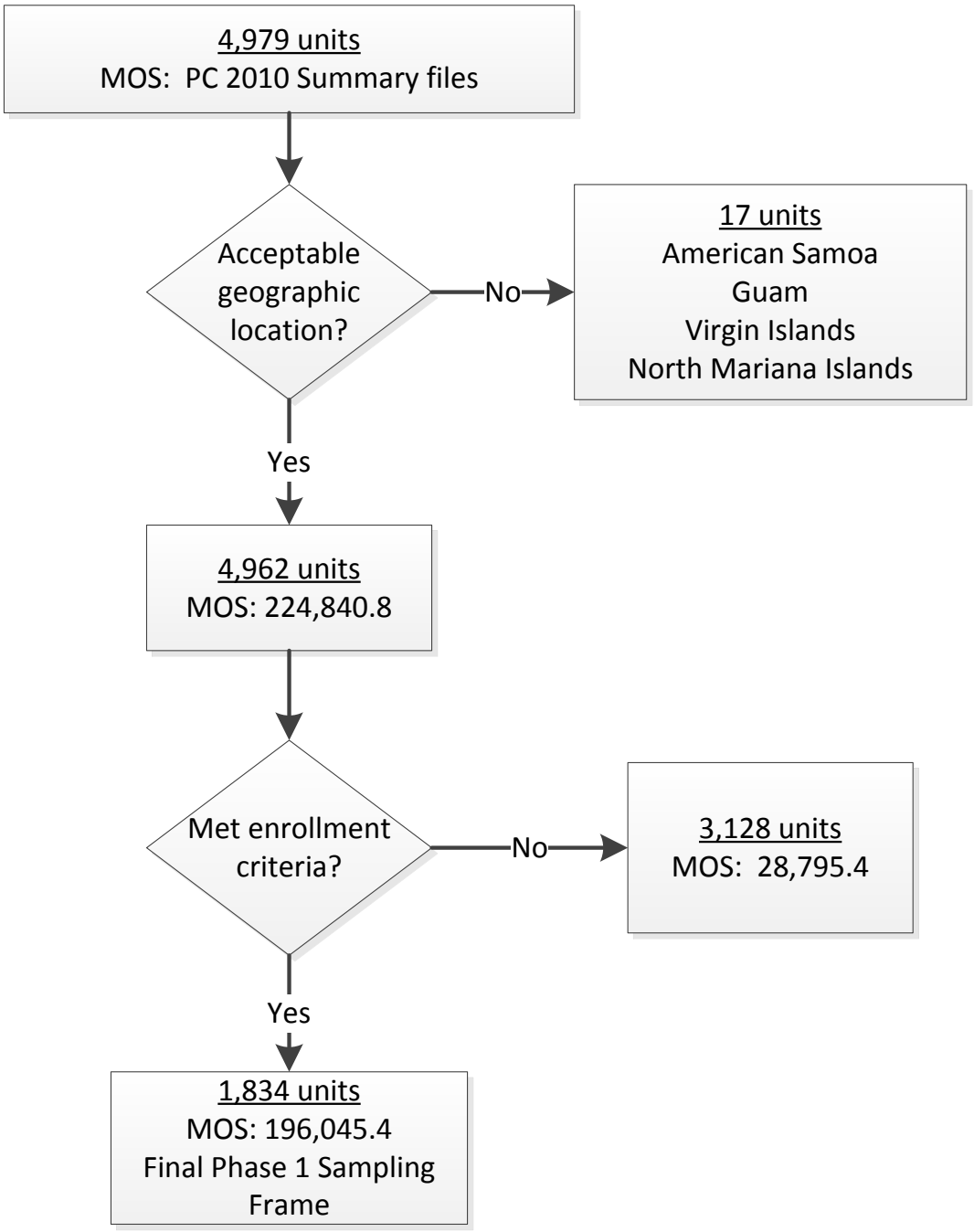
B.3.2 Exclusion of Ineligible Units

As shown in Figure B-2, a total of 4,979 units appeared on the PC2010 summary file that served as the basis for creating the sampling frame. Of these, a very small proportion (17 units) was dropped because of geographic location (American Samoa, Guam, Northern Mariana Islands, U.S. Virgin Islands). Since the units in these territories represented only 0.3 percent of the total sampling frame, this did not impact the representativeness of the frame. The remaining 4,962 units had a total MOS of 224,840.8. Of these, 3,128 units (with a total MOS of 28,795.4, about 12.8 percent of the total

[22]The 20 percent figure is based on an estimate from the Early Childhood Longitudinal Study-Birth Cohort that 20 percent of infants enrolled in WIC were not enrolled prenatally.

among geographically eligible units) were dropped because their MOS value was less than 30. As a result, the final Phase 1 sampling frame contained a total of 1,834 units, with a total MOS of 196,045.4.

Figure B-2. Exclusion of ineligibles from unit selection process



B.3.3 Stratification and Selection of the Phase 1 Sample

As noted above, the sample was designed to yield 80 sampled service sites. To achieve this, a total of 40 strata were formed, and ultimately (after two phases of selection) two sites were sampled from each of these strata. Five characteristics of the first-stage sampling unit or its SA were used to form the strata (note that the first three of these five characteristics are features of the State WIC Agency Plan that were used to group the WIC SA programs into categories):

- **Peer Counseling Program.** Whether the SA has a breastfeeding peer counseling program in place.[23]
- **Trained Paraprofessionals.** Whether SA policy allows for trained paraprofessionals to provide nutrition education (vs. requiring that staff that provide nutrition education have professional training or credentials).
- **Policy to Provide Formula.** Whether SA policy is to provide one can of formula for breastfeeding infants during the first 30 days of life.
- **Percent of Women Who Used Fully Breastfeeding Package.** This variable was an estimate of the percentage of women in the first-stage sampling unit who utilized the fully breastfeeding food package during the postpartum period. The PC2010 data were used to measure food-package selection by first-stage sampling unit, and this rate was computed by taking the ratio of the number of postpartum women who received the fully breastfeeding package during April of 2010 to the total number of postpartum women receiving any food package that same month.
- **Average of Children's and Mothers' High Weight for Height Rates.** The PC2010 data were used to estimate the percents of children and of mothers who are "high weight for height"[24] at the first-stage sampling unit level, and these percentages were averaged together to get a measure of risk of being overweight for all participants at the first-stage sampling unit level.

Using these characteristics (i.e., combinations of different levels of these variables), the first-stage sampling units were grouped to form 40 fairly homogenous strata of roughly equal size (in terms of total MOS). Specifically, the first-stage sampling units in a given stratum all came from State Agencies in the same State WIC Agency Plan classification (based on the three SA plan

[23]It turned out that there was no variation in this characteristic; all states reported offering a breastfeeding-peer counseling program.

[24]For children (12 months or older), "high weight for height" is determined based on nutrition risk code 110. For children 24 months and older, it is defined as higher than the 95th percentile of BMI for age. For children 12 to 24 months, it is defined as at risk of being overweight by virtue of having a mother or father who is obese (BMI of 30 or greater). For mothers, the criterion is a pregravid BMI of 25 or higher.

characteristics discussed above) and, to the extent possible, had similar fully breastfeeding and "high weight for height" rates.

One first-stage sampling unit (PHFE-WIC, in California) was, by itself, large enough (in terms of the total MOS) to constitute a stratum. That is, this unit (a local agency) was a certainty stratum, meaning that the unit was included in the first-stage sample with certainty. The service sites associated with the local agency were enumerated and sampled as described below.

Table B-1 presents a tabulation of how the strata were defined. Specifically, each particular combination shown in the (1) cross-tabulation of the features of the WIC State Agency plan, (2) exclusively breastfeeding range, and (3) high weight for height range, constitutes a stratum. This tabulation shows, for each stratum, the total MOS, the number of units on the sampling frame, the number of units selected in the first phase, the number of sampled Phase 1 units that were eligible for Phase 2 selection, and the number of units sampled in the second phase. Each of the counts of units was broken down by local agencies and individual sites.

Besides the certainty stratum, there were a few cases in which a particular first-stage sampling unit was sufficiently large to be sampled with certainty in the first phase of selection; that is, the unit's measure of size (MOS) was greater than one-fourth of the total MOS for its stratum, so that its probability of selection in a probability proportional to size (PPS) design was 1.

Table B-1. Definitions of the strata used for site sampling and key sampling statistics by stratum

Stratum ID	Features of the state WIC program	% of Women who used fully breastfeeding package	Children and mothers' high weight for height rates (%)	Total stratum measure of size	Number of											
					Units on frame			Phase 1 units sampled			Phase units sampled eligible for phase 2			Phase 2 units sampled		
					Total	Agencies	Sites	Total	Agencies	Sites	Total	Agencies	Sites	Total	Agencies	Sites
101	Does the state operate a breastfeeding peer counseling program? YES Does the State require that general nutrition education be provided by a professional staff member, e.g., dietitian, nurse? NO Is infant formula issued in the 1st month to partially breastfed infants? NO	0 – 10.5691	0 – 36.7147	4,997.2	65	1	64	4	0	4	4	0	4	2	0	2
102		0 – 10.5691	36.7147 – 45.9689	4,952.0	62	0	62	4	0	4	3	0	3	2	0	2
103		10.5691 – 14.4928	0 – 35.5971	4,994.0	61	4	57	4	0	4	4	0	4	2	0	2
104		10.5691 – 14.4928	35.5971 – 44.0943	5,000.0	49	3	46	4	0	4	3	0	3	2	0	2
105		14.4928 – 20.3863	0 – 33.5319	4,973.4	66	4	62	4	0	4	4	0	4	2	0	2
106		14.4928 – 20.3863	33.5319 – 44.3548	4,980.8	63	9	54	4	1	3	2	0	2	2	0	2
107		20.3863 – 63.5838	0 – 30.7242	5,019.4	59	28	31	4	3	1	4	3	1	2	1	1
108		20.3863 – 63.5838	30.7242 – 33.0749	4,988.0	43	16	27	4	2	2	4	2	2	2	1	1
109		20.3863 – 63.5838	33.0749 – 35.2011	4,999.6	52	14	38	4	2	2	4	2	2	2	1	1
110		20.3863 – 63.5838	35.2011 – 52.7565	4,968.4	67	22	45	4	2	2	2	0	2	2	0	2

Table B-1. Definitions of the strata used for site sampling and key sampling statistics by stratum (continued)

Stratum ID	Features of the state WIC program	% of Women who used fully breastfeeding package	Children and mothers' high weight for height rates (%)	Total stratum measure of size	Number of											
					Units on frame			Phase 1 units sampled			Phase units sampled eligible for phase 2			Phase 2 units sampled		
					Total	Agencies	Sites	Total	Agencies	Sites	Total	Agencies	Sites	Total	Agencies	Sites
200	Does the state operate a breastfeeding peer counseling program? YES Does the State require that general nutrition education be provided by a professional staff member, e.g., dietitian, nurse? NO Is infant formula issued in the 1st month to partially breastfed infants? YES	0 – 100	0 – 100	6,340.4	1	1	0	1	1	0	1	1	0	1	1	0
201		0 – 14.2857	0 – 28.7699	4,874.6	64	14	50	4	1	3	4	1	3	2	0	2
202		0 – 14.2857	28.7699 – 30.9995	4,905.0	47	11	36	4	2	2	3	1	2	2	1	1
203		0 – 14.2857	30.9995 – 33.0338	4,839.8	47	10	37	4	1	3	3	1	2	2	0	2
204		0 – 14.2857	33.0338 – 34.1299	4,913.8	45	14	31	4	3	1	4	3	1	2	1	1
205		0 – 14.2857	34.1299 – 35.0733	4,893.4	48	12	36	4	1	3	4	1	3	2	1	1
206		0 – 14.2857	35.0733 – 35.8987	4,853.8	45	17	28	4	2	2	3	2	1	2	1	1
207		0 – 14.2857	35.8987 – 36.6585	4,881.4	45	18	27	4	3	1	4	3	1	2	2	0
208		0 – 14.2857	36.6585 – 37.5487	4,868.6	40	18	22	4	4	0	4	4	0	2	2	0
209		0 – 14.2857	37.5487 – 39.0369	4,961.8	39	18	21	4	1	3	4	1	3	2	0	2
210		0 – 14.2857	39.0369 – 40.9907	4,768.6	38	17	21	4	3	1	4	3	1	2	2	0
211		0 – 14.2857	40.9907 – 44.6064	4,982.6	53	21	32	4	3	1	4	3	1	2	1	1
212		0 – 14.2857	44.6064 – 61.7659	4,874.4	55	24	31	4	3	1	3	2	1	2	1	1
213		14.2857 – 20.9273	0 – 31.9917	4,934.6	36	9	27	4	2	2	4	2	2	2	2	0
214		14.2857 – 20.9273	31.9917 – 34.1434	4,837.4	45	7	38	4	1	3	4	1	3	2	1	1
215		14.2857 – 20.9273	34.1434 – 35.2664	5,028.0	29	10	19	4	1	3	3	1	2	2	1	1
216		14.2857 – 20.9273	35.2664 – 37.6706	4,989.8	47	19	28	4	2	2	3	2	1	2	1	1
217		14.2857 – 20.9273	37.6706 – 41.8135	4,935.6	49	17	32	4	2	2	4	2	2	2	2	0
218		14.2857 – 20.9273	41.8135 – 55.0665	4,860.4	49	19	30	4	2	2	3	2	1	2	2	0
219		20.9273 – 29.3196	0 – 32.3818	4,892.6	39	8	31	4	2	2	4	2	2	2	1	1
220		20.9273 – 29.3196	32.3818 – 36.7067	4,924.8	56	20	36	4	3	1	4	3	1	2	1	1
221		20.9273 – 29.3196	36.7067 – 38.5783	4,897.2	23	13	10	4	4	0	4	4	0	2	2	0
222		20.9273 – 29.3196	38.5783 – 52.1351	4,912.4	44	22	22	4	3	1	4	3	1	2	2	0
223		29.3196 – 35.9756	0 – 32.5106	4,823.4	30	18	12	4	4	0	3	3	0	2	2	0
224		29.3196 – 35.9756	32.5106 – 49.5159	4,706.6	36	20	16	4	2	2	4	2	2	2	1	1
225		35.9756 – 69.1358	0 – 32.6778	4,878.4	28	24	4	4	3	1	3	3	0	2	2	0
226		35.9756 – 69.1358	32.6778 – 47.0875	4,954.0	38	32	6	4	4	0	3	3	0	2	2	0

Table B-1. Definitions of the strata used for site sampling and key sampling statistics by stratum (continued)

Stratum ID	Features of the state WIC program	% of Women who used fully breastfeeding package	Children and mothers' high weight for height rates (%)	Total stratum measure of size	Number of											
					Units on frame			Phase 1 units sampled			Phase units sampled eligible for phase 2			Phase 2 units sampled		
					Total	Agencies	Sites	Total	Agencies	Sites	Total	Agencies	Sites	Total	Agencies	Sites
301	Does the state operate a breastfeeding peer counseling program? YES Does the State require that general nutrition education be provided by a professional staff member, e.g., dietitian, nurse? YES Is infant formula issued in the 1st month to partially breastfed infants? N/A	0 – 7.6336	0 – 100	4,222.0	47	4	43	4	1	3	3	1	2	2	1	1
302		7.6336 – 33.3992	0 – 34.2542	4,262.8	37	10	27	4	3	1	3	2	1	2	2	0
303		7.6336 – 33.3992	34.2542 – 50.2087	4,154.4	47	6	41	4	1	3	4	1	3	2	1	1
TOTAL				196,045.4	1,834	554	1,280	157	78	79	139	70	69	79	42	37

B.3.4 Stage 1 Sampling: Selection of the Phase 2 Sample

Following the selection of the Phase 1 sample of 160 first-stage units, further work was undertaken to enumerate individual service sites (when the first-stage unit was a local agency), ascertain each unit's eligibility, and select the final sample of sites. During April 2012, 42 State Agencies were sent an introductory letter and asked to review a list of local agencies in their State in the Phase 1 sampling frame of 160 units and provide information needed for Phase 2 of sampling. The 42 State Agencies were divided into two groups based on the information they reported for the PC2010 census. The 21 State Agencies in Group A reported their local agencies on the census, but not the service sites under the local agencies. The 21 State Agencies in Group B reported their local agencies but also reported IDs for the sites under the local agencies. Group A was sent a list of all their local agencies on the sampling frame, along with the names of the sites within each local agency, based on information we obtained from their State and local web sites. They were asked to review the list of local agencies and service sites, remove sites that were not operational, and add sites that were missing from the list. State Agencies in Group B were sent a list of local agencies and the ID numbers of service sites under the local agencies, and were asked to provide the name of the site corresponding to the site number(s), and indicate whether or not the site(s) was expected to continue as an operational site for the next 12 months.

The State Agencies were also asked to provide five items of information about their sites on the frame that would be operational for the next 12 months: (1) number of days the site was open to conduct prenatal and infant enrollments during January 2012, (2) total number of participants served that month, (3) number of prenatal women enrolled during that month, (4) number of infants enrolled during that month, and (5) whether any of the prenatal and infant participants were enrolled at outreach locations affiliated with the site.

The information provided by the State Agencies was used to determine eligibility for the Phase 2 sample. Sites that were not expected to continue in operations for the next 12 months and sites that did not meet the eligibility criteria (in terms of enrollment flow) were designated as ineligible. If the first-stage sampling unit was a local agency, that unit was designated as ineligible if all sites associated with the local agency were ineligible; otherwise, that unit was eligible.

Subsampling (second-phase selection) of eligible first-stage sampling units was done to arrive at the final sample of first-stage sampling units. In each of the 40 strata (the same strata used for the Phase 1 sample) two first-stage units were sampled with equal probability from among the eligible units.

B.4 Stage 2 Sampling

As shown in Figure B-1, Stage 1 sampling units selected in the Phase 2 sample that were local agencies (i.e., consisted of more than one service site), went through a second stage of sampling to select one service site. For each first-stage sampling unit that was a local agency, the eligible service sites were listed. An MOS that reflected the expected average daily enrollment was obtained for each service site by summing the January 2012 prenatal enrollment and 20 percent of the January 2012 infant enrollment, and dividing this total by the number of enrollment days in January 2012. Within each local agency in the Phase 2 sample, exactly one service site was sampled from the eligible sites with probabilities proportional to this MOS. The final sample of service sites contained a total of 80 sites in 27 State agencies.

B.5 Site Replacements

During site sampling, candidate replacement sites were designated for each sampled site. These replacements were available for use in the event that the sampled site was unable or unwilling to participate in the study. All replacements were selected at the same time as the original sample from the same stratum as the sampled sites and had a similar measure of size. This replacement of sites by matched substitutes is similar to imputation and thus does not affect the weights of any member of the sample. A total of six sites were replaced.

B.6 Sampling New WIC Enrollees

B.6.1 Recruitment Windows

The sample included all prenatal mothers or their babies less than 2.5 months old who were newly enrolled into WIC at the sampled site during a pre-specified recruitment window. Mothers were eligible to participate even if they had enrolled in WIC for a previous pregnancy or previous child. The recruitment window was a consecutive string of days in which all new WIC enrollees in that site were designated to be screened for eligibility and recruited into ITFPS-2. The length of the recruitment window for each site was predetermined based on the estimated amount of time that

would have been needed in July 2012[25] to yield 98 new WIC enrollees per site (the target sample size for each site). Since the flow of new WIC enrollees into the 80 sampled sites was decidedly different, the window length was much shorter in clinics with a "high flow" of new enrollees compared with clinics with a "low flow." The study screening and enrollment processes did not necessarily occur during the recruitment window, but the study participants must have enrolled in WIC at the service site during the recruitment period.

After notifying the sites of their selection into the study, we provided them enrollment data obtained from the WIC PC2010 dataset on their participation, prenatal and infant enrollment rates, and the site days of operation for January 2012. The sites were asked to identify any significant changes to the information (such as increases or decreases in participation or prenatal/infant enrollments between January and August), and to update the site schedule for enrolling new participants.

The length of the recruitment window for each site was calculated based on the updated enrollment figures and the total recruitment period was set at 20 weeks. The recruitment windows ranged from 4 to 77 days per site. The recruitment protocol called for staggering the launch of recruitment in the 80 sites over a nine week period and each site was randomly assigned to a "release group" which corresponded to one of the nine weeks that recruitment was launched. A site's eligibility for a given release group depended on the length of that site's recruitment window. For example, a site that required a 3-month recruitment window could not be assigned to the last release group. Thus, the randomization of recruitment windows took into account each site's window length but was also done in such a manner that the planned number of sites was assigned to each release group. The first and last release groups each included five sites while the remaining release groups each included 10 sites. In general, recruitment in the sites was launched on the Monday of the recruitment week.

The 20-week recruitment period began July 1, 2013 and ended November 18, 2013. Before starting recruitment we increased the recruitment window for each site by 3 percent to serve as a buffer based on new enrollment data that suggested the WIC enrollment was declining. However, even with the 3 percent buffer, after 4 weeks into recruitment with 40 sites in the field (August 1, 2013), we projected we would only reach about 84 percent of the estimated number of eligible WIC women relative to the expected numbers that were estimated in July 2012. As a result, all recruitment windows were extended by an additional 10 percent (with the exception of 5 sites where the full 10 percent extension could not be achieved while still ending recruitment on November 18).

[25] July 2012 was the month the sites provided updated enrollment counts and schedule information prior to calculating recruitment windows

B.6.2 Core and Supplemental Samples

Two samples were selected at each service site: a core longitudinal and supplemental cross-sectional sample. The core sample was originally designed to be an equal probability sample of all new enrollees. The supplemental sample was designed to focus on subpopulations with specific characteristics such as African American mothers and infants enrolled postnatally with no prenatal WIC exposure. The supplemental sample was not designed to be analyzed by itself but only in conjunction with the core sample. Under the original design, the two samples were to start out as equal in size with an average of 49 (one half of the total of 98) new enrollees each per service site. The supplemental sample was designed to be considerably smaller after screening and subsampling.

During recruitment, each pregnant client was asked if this was the first time she had enrolled for WIC during this pregnancy, and each mother of a newly enrolling infant was asked if she was enrolled in WIC during her pregnancy for the infant at hand. For both prenatal and postnatal enrollees, only first-time enrollees were eligible for the sample. With this approach, ineligible postpartum mothers and infants were immediately screened out of the sample. During recruitment, the sample was screened to determine race, ethnicity, trimester at enrollment, pre-pregnancy BMI, household composition, and income, and new enrollees not required to achieve the subgroup targets were subsampled from the supplemental sample. This approach was designed to drop approximately: 68 percent of white mothers; 81 percent of Hispanic mothers; 71 percent of mothers in their first trimester; 68 percent of mothers in their second or third trimester; 18 percent of mothers enrolling postnatally; 58 percent of obese mothers; 29 percent of overweight mothers; 71 percent of mother with low or normal pre-pregnancy BMI; 54 percent of mothers with income at or below 75 percent of poverty; 64 percent of mothers with income between 76-130 percent of poverty; and 69 percent of mothers with income above 130 percent of poverty. These rates were based on the sample sizes needed to support the precision requirements (power projections) and were determined by taking into account estimated population distributions.

Following the decision to extend the recruitment windows by 13 percent, the sample was closely monitored to determine whether recruitment targets could be met. Several weeks of tracking the enrollment of prenatal mothers and their infants into WIC in each of the 80 sites confirmed that we could not meet the projected study recruitment targets. To compensate we altered the study participant sampling process to eliminate the subsampling of participants in the supplemental sample. Additionally, the proportion of sampled cases designated for the core (versus supplemental) sample was revised to 87.5 percent (a change from the original 50 percent).

These changes were designed to meet the core target sample size (based on the lower than expected WIC enrollment flows that had been observed to date) and meet or exceed the overall target sample size. The core sample remains nationally representative. Following these changes, no eligible participant was subsampled out; thus, the demographic characteristics of the supplemental sample after the change differed considerably from the demographic profile before the change. These changes went into effect as of August 27, 2013. Cases completing the screener prior to August 27, 2013 were sampled using the original rates, and cases completing the screener on or after August 27, 2013 were sampled using the revised rates.

B.6.3 Multiple Births

For those WIC mothers who had twins, triplets, and so on, a single infant was sampled at the first postnatal interview.

B.7 Details of the Weighting Procedures

B.7.1 Computation of Survey Weights

Survey weights were computed for the prenatal sample to account for differential probabilities of selection and nonresponse. For each sampled site, the site-level base weight was computed as the reciprocal of the probability of selection of the site. For example, if a site was sampled with probability equal to 1/100, its base weight was 100. Because sites were sampled within strata with probabilities proportionate to their estimated size, there was variation in these probabilities. The site-level base weights varied from 4.9 to 64.9.

The site-level base weights were adjusted to account for the probability of sampling the participant within the site. This adjustment accounts for the length of the recruitment window at the site (relative to the total number of days the site was enrolling participants during the study recruitment period). The resulting weight was the participant-level base weight, and these weights varied from 23.2 to 245.0.

As discussed in Section 1.3, two samples were selected at each site: a core longitudinal and supplemental sample. For some interviews, both the core and supplemental sample (combined) will

be interviewed, while for other interviews, only the core sample will be interviewed. The participant weights for these interviews include factors to account for the subsampling of participants for the core sample and for the subsampling of participants in the supplemental sample, to produce core-only sample weights and combined sample weights. The weights for a particular interview are based on the sample to which the interview was administered.

For those WIC mothers who have multiple births, a single infant was sampled at the first postnatal interview, and the weights account for the sampling of the particular infant.

B.7.2 Adjusting for Nonresponse

Nonresponse occurs as a result of respondents refusing or being unable to participate in some interviews. To reduce the potential nonresponse bias, the base weights were adjusted to compensate for differential nonresponse. A weighting class adjustment (Brick and Kalton, 1996) was used to adjust for nonresponse. With this approach, weighting classes are formed (using variables known for respondents and non-respondents), and non-respondents' weights are redistributed to respondents within the same weighting class. Characteristics used to form the weighting classes should be associated with the probability of response as well as key survey outcome variables (Little and Vartivarian, 2003). In the early stages of recruitment for ITFPS-2, however, very limited information was available for both respondents and non-respondents. The characteristics used to form weighting classes to adjust for nonresponse at each stage were as follows:

- **Adjusting for log nonresponse and nonresponse to the screener**: Service site;
- **Adjusting for nonresponse to the enrollment instrument or failure to consent to the study**: Mother's age, timing of WIC enrollment (1st trimester, 2nd trimester, 3rd trimester, postnatal), mother's weight category (overweight, obese, other), mother's Hispanic origin, mother's race, poverty status, and language; and
- **Adjusting for prenatal interview nonresponse**: Timing of WIC enrollment, mother's age, language, and race.

These adjustments were performed sequentially; that is, the base weights were adjusted for log nonresponse and nonresponse to the screener, these adjusted weights were adjusted for nonresponse to the enrollment instrument or failure to consent, and these adjusted weights were adjusted for prenatal interview nonresponse. Within these weighting classes, a weighted response

rate was computed (using the weights produced in the previous adjustment) and applied to the weights from the previous adjustment to obtain the corresponding nonresponse-adjusted weights.

B.7.3 Replicate Weights

In addition to the full sample weights described above, a series of replicate weights were created and attached to each data record for variance estimation. Replication methods provide a relatively simple and robust approach to estimating sampling variances for complex survey data (Rust and Rao, 1996). The basic replication approach is to repeatedly select portions of the sample ("replicates") and then to apply the weighting process developed for the full sample to each replicate separately. The estimate of interest is calculated for each replicate. The variability among these estimates is then used to estimate the variance of the full sample statistics. The replicate weights were used to calculate standard errors of the survey-based estimates and to conduct significance tests and other analyses.

Different approaches can be used to create these replicates. For WIC ITFPS-2, 40 replicates were created, and the replication approach that was used is a modified balanced repeated replication (BRR) method suggested by Fay (Judkins, 1990). When estimating the variance of ratios of rare subsets, one problem that occasionally arises from standard BRR is that one or more replicate estimates will be undefined due to zero denominators. Instead of increasing the weights of one half-sample by 100 percent and decreasing the weights of the other half-sample to zero as in standard BRR, Fay's method perturbs the weights by ± 100 (1-K) percent where K is referred to as "Fay's factor." The perturbation factor for standard BRR is 100 percent, or K=0. For WIC ITFPS-2, K=0.3 was used.

B.8 Imputation

Imputation was used to adjust for item nonresponse (i.e., missing data for particular items among those who respond to a given wave). Ultimately, all the key socio-demographic variables (see Section 1.7) will be imputed for the total sample. As interviews are occurring on a rolling basis, to date the key socio-demographic variables have been imputed only for women who joined WIC prenatally. As with weighting, a carefully designed imputation procedure aims to reduce bias due to nonresponse (in this case, item nonresponse). The hot deck imputation method was used to generate the imputations (Kalton and Kasprzyk, 1982). With this approach, imputation cells are

formed by cross-classifying variables that are associated with the variable being imputed and, where possible, also associated with the probability of response to the variable being imputed.

Appendix C
Primary Tables by Key Socio-Demographic Variables

In this appendix, each of the main analyses tables is crossed by key socio-demographic variables. Specifically, this appendix displays cross tabular data by 10 socio-demographic variables on the percentage of WIC-prenatal mothers: (1) who agree with the benefits of breastfeeding, (2) who agree with the barriers to breastfeeding, and (3) who are aware of certain WIC program elements and received select services, as well as (4) the distribution of infant feeding intention (IFI) scores. As of the prenatal interview, 10 of the 23 key socio-demographic variables have been collected. We apply these 10 socio-demographic variables to each table in the following order:

a. Race;

b. Ethnicity;

c. Current Marital Status of the Mother;

d. Food Security (measured using the 6-item module);

e. Participation in non-WIC Benefit Program(s);

f. Parity;

g. Timing of WIC Enrollment;

h. Weight Status of the Mother before Pregnancy;

i. Income Poverty; and

j. Breastfeeding History.

The number of socio-demographic variables will expand as the study proceeds, eventually totaling 23 when the socio-demographic data are complete.

Significance tests were conducted on the crosstabs to determine whether the distribution of prenatal mothers within a socio-demographic group (e.g., race) changed with the variable of interest (e.g., IFI scale scores). For the estimates that are proportions, a chi-square test, appropriately adjusted for our complex sample design, was used to determine if observed differences were statistically significant or the result of normal sampling error. Using race and the distribution of women's IFI scale scores as an example, the chi-square test was run to determine whether the distribution of women across racial categories varied with the IFI scores. It should be noted that a chi-square test of the

association of race with IFI scores indicates whether racial distribution changes with IFI scores but does not indicate how racial subgroups differ from each other (i.e., whether African American mothers differ from white mothers.) Only large differences between specific subgroups are likely to be statistically significant.

All prenatal respondents were asked each of the questions used in this report, so there is only one source of missing data: respondents skipping questions. When a respondent skips a question, it is referred to as item non-response. To address the fact that sample sizes vary between analyses due to item nonresponse, sample sizes have been included in the tables.

Table C-1a. Percentage of prenatal mothers agreeing with statements about perceived benefits of breastfeeding by race

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Race		
		Black or African American % (SE)	White % (SE)	Other % (SE)
Breastfeeding is easier than formula feeding[b]	55.3 (2.1)	47.2 (3.3)	53.4 (2.1)	68.6 (2.7)
Breastfeeding helps protect the baby from diseases[b]	81.2 (1.3)	74.0 (2.6)	82.4 (1.6)	85.0 (2.1)
Breastfed babies are healthier than formula-fed babies[b]	79.7 (1.5)	75.4 (3.1)	78.8 (1.6)	86.3 (2.2)
Breastfeeding brings a mother closer to her baby[b]	87.9 (0.9)	84.0 (2.1)	88.4 (1.0)	90.3 (1.7)
Breastmilk alone gives a new baby all he/she needs to eat	71.3 (1.5)	66.9 (2.1)	71.5 (1.8)	74.9 (2.7)
Breastfeeding helps women lose weight	74.5 (1.3)	73.8 (2.5)	74.4 (1.6)	75.3 (1.7)
Breastfeeding reduces the risk of a child becoming overweight	50.0 (1.7)	45.0 (2.5)	51.3 (2.1)	51.3 (4.1)
Unwgt n[a]	2,649	582	1,606	461
Wgt n	395,398	82,231	230,878	82,289

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of race differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18a through KA18f and KA18n.

Table C-1b. Percentage of prenatal mothers agreeing with statements about perceived benefits of breastfeeding by ethnicity

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Ethnicity	
		Hispanic % (SE)	Non-Hispanic % (SE)
Breastfeeding is easier than formula feeding[b]	55.3 (2.1)	68.5 (1.6)	43.5 (2.2)
Breastfeeding helps protect the baby from diseases[b]	81.2 (1.3)	87.9 (1.7)	75.2 (1.4)
Breastfed babies are healthier than formula-fed babies[b]	79.7 (1.5)	88.5 (1.1)	71.8 (1.8)
Breastfeeding brings a mother closer to her baby[b]	87.9 (0.9)	92.8 (1.0)	83.5 (1.4)
Breastmilk alone gives a new baby all he/she needs to eat[b]	71.3 (1.5)	78.0 (1.9)	65.3 (1.8)
Breastfeeding helps women lose weight[b]	74.5 (1.3)	78.6 (1.6)	70.7 (1.8)
Breastfeeding reduces the risk of a child becoming overweight[b]	50.0 (1.7)	58.0 (2.7)	42.8 (2.0)
Unwgt n[a]	2,649	1,089	1,560
Wgt n	395,398	186,511	208,887

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of ethnicity differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18a through KA18f and KA18n.

Table C-1c. Percentage of prenatal mothers agreeing with statements about perceived benefits of breastfeeding by current marital status of mother

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Current Marital Status of Mother	
		Married % (SE)	Not Married (includes divorced and widowed) % (SE)
Breastfeeding is easier than formula feeding[b]	55.3 (2.1)	59.2 (2.7)	53.5 (2.2)
Breastfeeding helps protect the baby from diseases[b]	81.2 (1.3)	89.4 (1.5)	77.5 (1.5)
Breastfed babies are healthier than formula-fed babies	79.7 (1.5)	81.7 (1.6)	78.8 (1.8)
Breastfeeding brings a mother closer to her baby[b]	87.9 (0.9)	90.1 (1.3)	86.9 (1.2)
Breastmilk alone gives a new baby all he/she needs to eat[b]	71.3 (1.5)	79.4 (1.8)	67.6 (1.7)
Breastfeeding helps women lose weight	74.5 (1.3)	78.0 (1.6)	72.9 (1.6)
Breastfeeding reduces the risk of a child becoming overweight[b]	50.0 (1.7)	57.9 (2.1)	46.4 (1.9)
Unwgt n[a]	2,649	792	1,857
Wgt n	395,398	122,642	272,756

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of marital status of mother differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18a through KA18f and KA18n.

Table C-1d. Percentage of prenatal mothers agreeing with statements about perceived benefits of breastfeeding by food security (measured using 6-item module)

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Food Security (measured using 6-item module)		
		High or Marginal Food Security % (SE)	Low Food Security % (SE)	Very Low Food Security % (SE)
Breastfeeding is easier than formula feeding	55.3 (2.1)	58.0 (2.4)	53.8 (2.5)	49.4 (3.6)
Breastfeeding helps protect the baby from diseases	81.2 (1.3)	81.0 (1.4)	80.9 (1.9)	82.5 (1.9)
Breastfed babies are healthier than formula-fed babies	79.7 (1.5)	81.5 (1.5)	78.1 (2.1)	76.7 (3.0)
Breastfeeding brings a mother closer to her baby	87.9 (0.9)	88.2 (1.3)	88.2 (1.3)	86.4 (2.3)
Breastmilk alone gives a new baby all he/she needs to eat	71.3 (1.5)	73.0 (1.8)	70.2 (2.1)	67.6 (2.8)
Breastfeeding helps women lose weight	74.5 (1.3)	74.1 (1.6)	75.5 (1.9)	73.7 (2.8)
Breastfeeding reduces the risk of a child becoming overweight[b]	50.0 (1.7)	53.0 (1.9)	47.2 (2.5)	45.8 (3.3)
Unwgt n[a]	2,649	1,364	832	453
Wgt n	395,398	205,864	125,080	64,455

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of food security differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18a through KA18f and KA18n.

Table C-1e. Percentage of prenatal mothers agreeing with statements about perceived benefits of breastfeeding by participation in non-WIC benefit program(s)

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Participation in non-WIC Benefit Program(s)		
		Does not Participate in Any Other Program % (SE)	Participates in Other Program and Is On SNAP % (SE)	Participates in Other Programs and Is Not On SNAP % (SE)
Breastfeeding is easier than formula feeding	55.3 (2.1)	52.5 (2.7)	53.6 (2.5)	58.9 (2.9)
Breastfeeding helps protect the baby from diseases	81.2 (1.3)	82.8 (2.0)	78.8 (1.8)	83.7 (1.4)
Breastfed babies are healthier than formula-fed babies[b]	79.7 (1.5)	82.7 (2.0)	76.6 (2.2)	82.4 (1.6)
Breastfeeding brings a mother closer to her baby[b]	87.9 (0.9)	91.1 (1.8)	85.9 (1.1)	89.1 (1.2)
Breastmilk alone gives a new baby all he/she needs to eat[b]	71.3 (1.5)	77.4 (2.6)	69.0 (2.0)	71.4 (1.8)
Breastfeeding helps women lose weight	74.5 (1.3)	75.7 (2.5)	72.3 (1.9)	76.9 (1.5)
Breastfeeding reduces the risk of a child becoming overweight[b]	50.0 (1.7)	55.9 (3.4)	46.1 (1.9)	52.4 (1.9)
Unwgt n[a]	2,649	422	1,300	927
Wgt n	395,398	67,072	190,413	137,913

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.

[b] Chi-square statistic testing of participation in non-WIC benefit program(s) differences is significant at $p \leq 0.05$.

Data source: Prenatal interview questions KA18a through KA18f and KA18n.

Table C-1f. Percentage of prenatal mothers agreeing with statements about perceived benefits of breastfeeding by parity

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Parity		
		First Born % (SE)	Second Born % (SE)	Third or Subsequent Born % (SE)
Breastfeeding is easier than formula feeding	55.3 (2.1)	53.2 (2.6)	54.3 (2.6)	59.0 (3.0)
Breastfeeding helps protect the baby from diseases[b]	81.2 (1.3)	77.3 (1.8)	81.8 (1.6)	86.0 (1.8)
Breastfed babies are healthier than formula-fed babies[b]	79.7 (1.5)	84.3 (1.6)	74.6 (1.9)	77.9 (2.2)
Breastfeeding brings a mother closer to her baby	87.9 (0.9)	89.6 (1.4)	86.0 (1.1)	87.3 (1.8)
Breastmilk alone gives a new baby all he/she needs to eat	71.3 (1.5)	70.7 (2.1)	68.7 (1.7)	74.4 (2.5)
Breastfeeding helps women lose weight	74.5 (1.3)	71.6 (2.0)	77.8 (1.6)	75.3 (2.1)
Breastfeeding reduces the risk of a child becoming overweight	50.0 (1.7)	48.2 (2.7)	52.7 (2.2)	49.9 (2.6)
Unwgt n[a]	2,649	1,116	738	795
Wgt n	395,398	163,955	110,742	120,702

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.

[b] Chi-square statistic testing of parity differences is significant at $p \leq 0.05$.

Data source: Prenatal interview questions KA18a through KA18f and KA18n.

Table C-1g. Percentage of prenatal mothers agreeing with statements about perceived benefits of breastfeeding by timing of WIC enrollment

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Timing of WIC Enrollment		
		1st Trimester % (SE)	2nd Trimester % (SE)	3rd Trimester % (SE)
Breastfeeding is easier than formula feeding	55.3 (2.1)	57.7 (2.4)	55.1 (2.8)	50.3 (3.2)
Breastfeeding helps protect the baby from diseases	81.2 (1.3)	82.8 (1.6)	81.3 (1.6)	77.6 (2.2)
Breastfed babies are healthier than formula-fed babies	79.7 (1.5)	82.3 (1.5)	79.2 (2.1)	75.2 (2.6)
Breastfeeding brings a mother closer to her baby	87.9 (0.9)	89.4 (1.0)	87.4 (1.3)	85.8 (1.6)
Breastmilk alone gives a new baby all he/she needs to eat	71.3 (1.5)	72.0 (1.9)	71.3 (1.7)	69.7 (2.6)
Breastfeeding helps women lose weight	74.5 (1.3)	71.6 (2.2)	76.2 (1.5)	76.3 (2.6)
Breastfeeding reduces the risk of a child becoming overweight	50.0 (1.7)	51.4 (2.8)	49.2 (1.9)	48.9 (2.7)
Unwgt n[a]	2,649	1,045	1,223	381
Wgt n	395,398	149,891	177,447	68,060

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of timing of WIC enrollment differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18a through KA18f and KA18n.

Table C-1h. Percentage of prenatal mothers agreeing with statements about perceived benefits of breastfeeding by weight status of mother before pregnancy

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Weight Status of Mother Before Pregnancy		
		Normal and Underweight % (SE)	Overweight % (SE)	Obese % (SE)
Breastfeeding is easier than formula feeding	55.3 (2.1)	56.2 (2.5)	54.6 (2.8)	54.4 (2.9)
Breastfeeding helps protect the baby from diseases	81.2 (1.3)	79.9 (1.7)	83.8 (1.8)	81.1 (2.1)
Breastfed babies are healthier than formula-fed babies	79.7 (1.5)	80.0 (1.8)	80.1 (1.7)	78.8 (2.1)
Breastfeeding brings a mother closer to her baby[b]	87.9 (0.9)	86.4 (1.7)	91.8 (1.1)	86.9 (1.4)
Breastmilk alone gives a new baby all he/she needs to eat	71.3 (1.5)	70.7 (1.8)	72.2 (2.1)	71.4 (2.3)
Breastfeeding helps women lose weight	74.5 (1.3)	72.4 (2.0)	77.8 (2.0)	74.8 (1.9)
Breastfeeding reduces the risk of a child becoming overweight	50.0 (1.7)	51.9 (2.4)	49.0 (2.7)	47.8 (2.0)
Unwgt n[a]	2,649	1,229	648	772
Wgt n	395,398	181,970	98,494	114,935

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.

[b] Chi-square statistic testing of weight status of mother before pregnancy differences is significant at $p \leq 0.05$.

Data source: Prenatal interview questions KA18a through KA18f and KA18n.

Table C-1i. Percentage of prenatal mothers agreeing with statements about perceived benefits of breastfeeding by income poverty

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Income Poverty		
		75% of Poverty Guideline or Below % (SE)	Above 75% But No More Than 130% of Poverty Guideline % (SE)	Above 130% of Poverty Guideline % (SE)
Breastfeeding is easier than formula feeding[b]	55.3 (2.1)	57.5 (2.4)	54.3 (2.7)	44.0 (3.0)
Breastfeeding helps protect the baby from diseases	81.2 (1.3)	81.3 (1.6)	82.0 (2.0)	78.4 (2.8)
Breastfed babies are healthier than formula-fed babies	79.7 (1.5)	80.2 (1.7)	78.3 (1.9)	79.9 (2.4)
Breastfeeding brings a mother closer to her baby	87.9 (0.9)	88.2 (1.0)	87.3 (1.4)	87.4 (2.2)
Breastmilk alone gives a new baby all he/she needs to eat	71.3 (1.5)	71.3 (1.5)	71.5 (2.4)	70.1 (3.4)
Breastfeeding helps women lose weight	74.5 (1.3)	73.7 (1.6)	75.7 (1.7)	75.7 (3.6)
Breastfeeding reduces the risk of a child becoming overweight	50.0 (1.7)	49.1 (1.9)	52.6 (2.4)	48.2 (4.2)
Unwgt n[a]	2,649	1,671	736	242
Wgt n	395,398	248,938	107,512	38,949

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of income poverty differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18a through KA18f and KA18n.

Table C-1j. Percentage of prenatal mothers agreeing with statements about perceived benefits of breastfeeding by breastfeeding history

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Breastfeeding History		
		No History (includes first-time mothers) % (SE)	Three or Less Months % (SE)	More Than Three Months % (SE)
Breastfeeding is easier than formula feeding[b]	55.3 (2.1)	49.2 (2.5)	44.1 (2.4)	76.6 (2.3)
Breastfeeding helps protect the baby from diseases[b]	81.2 (1.3)	74.1 (1.8)	84.9 (2.0)	92.1 (1.1)
Breastfed babies are healthier than formula-fed babies[b]	79.7 (1.5)	78.0 (2.0)	71.0 (2.0)	90.0 (1.4)
Breastfeeding brings a mother closer to her baby[b]	87.9 (0.9)	84.3 (1.6)	87.3 (1.4)	95.3 (0.8)
Breastmilk alone gives a new baby all he/she needs to eat[b]	71.3 (1.5)	66.6 (2.2)	68.2 (2.6)	83.0 (1.6)
Breastfeeding helps women lose weight[b]	74.5 (1.3)	68.6 (1.9)	78.1 (2.4)	83.1 (1.5)
Breastfeeding reduces the risk of a child becoming overweight[b]	50.0 (1.7)	45.8 (2.5)	47.1 (2.4)	60.6 (2.7)
Unwgt n[a]	2,649	1,408	562	679
Wgt n	395,398	205,156	86,110	104,133

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of breastfeeding history differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18a through KA18f and KA18n.

Table C-2a. Percentage of prenatal mothers agreeing with statements about perceived barriers to breastfeeding by race

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Race		
		Black or African American % (SE)	White % (SE)	Other % (SE)
Breastfeeding takes too much time	14.7 (0.9)	15.6 (1.6)	13.8 (1.2)	16.4 (2.3)
Breastfeeding ties you down	17.3 (0.9)	18.2 (2.0)	17.5 (1.1)	16.1 (2.0)
Breastfeeding means no one else can feed your baby[b]	50.8 (1.8)	55.4 (2.8)	45.6 (2.2)	60.7 (2.1)
Breastfeeding is painful[b]	43.6 (1.0)	44.4 (2.8)	41.1 (1.4)	49.6 (2.7)
Breastmilk leaking onto your clothes is something I worry about[b]	27.4 (1.5)	34.4 (2.7)	25.2 (1.6)	26.6 (2.6)
With bottle feeding, the mother knows that the baby is getting enough to eat	67.0 (0.8)	65.0 (2.3)	68.1 (1.6)	66.1 (2.7)
Breastfeeding in public is not something I want to do	36.9 (1.5)	39.2 (3.0)	35.7 (1.9)	38.2 (3.3)
Unwgt n[a]	2,649	582	1,606	461
Wgt n	395,398	82,231	230,878	82,289

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.

[b] Chi-square statistic testing of race differences is significant at $p \leq 0.05$.

Data source: Prenatal interview questions KA18g through KA18m.

Table C-2b. Percentage of prenatal mothers agreeing with statements about perceived barriers to breastfeeding by ethnicity

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Ethnicity	
		Hispanic % (SE)	Non-Hispanic % (SE)
Breastfeeding takes too much time[b]	14.7 (0.9)	17.3 (1.4)	12.4 (0.9)
Breastfeeding ties you down[b]	17.3 (0.9)	15.3 (1.5)	19.1 (1.1)
Breastfeeding means no one else can feed your baby[b]	50.8 (1.8)	60.3 (2.1)	42.3 (2.1)
Breastfeeding is painful[b]	43.6 (1.0)	45.6 (1.3)	41.8 (1.3)
Breastmilk leaking onto your clothes is something I worry about[b]	27.4 (1.5)	23.4 (1.5)	31.0 (2.0)
With bottle feeding, the mother knows that the baby is getting enough to eat[b]	67.0 (0.8)	63.6 (1.7)	70.1 (1.4)
Breastfeeding in public is not something I want to do	36.9 (1.5)	35.1 (2.2)	38.6 (1.7)
Unwgt n[a]	2,649	1,089	1,560
Wgt n	395,398	186,511	208,887

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of ethnicity differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18g through KA18m.

Table C-2c. Percentage of prenatal mothers agreeing with statements about perceived barriers to breastfeeding by current marital status of mother

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Current Marital Status of Mother	
		Married % (SE)	Not Married (includes divorced and widowed) % (SE)
Breastfeeding takes too much time	14.7 (0.9)	16.2 (1.6)	14.0 (1.0)
Breastfeeding ties you down[b]	17.3 (0.9)	20.6 (1.8)	15.9 (1.0)
Breastfeeding means no one else can feed your baby	50.8 (1.8)	48.0 (2.9)	52.1 (1.7)
Breastfeeding is painful	43.6 (1.0)	45.8 (2.2)	42.5 (1.0)
Breastmilk leaking onto your clothes is something I worry about	27.4 (1.5)	26.1 (2.0)	28.0 (1.6)
With bottle feeding, the mother knows that the baby is getting enough to eat	67.0 (0.8)	65.4 (1.5)	67.8 (1.1)
Breastfeeding in public is not something I want to do	36.9 (1.5)	33.9 (2.4)	38.3 (1.6)
Unwgt n[a]	2,649	792	1,857
Wgt n	395,398	122,642	272,756

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of marital status of mother differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18g through KA18m.

Table C-2d. Percentage of prenatal mothers agreeing with statements about perceived barriers to breastfeeding by food security (measured using 6-item module)

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Food Security (measured using 6-item module)		
		High or Marginal Food Security % (SE)	Low Food Security % (SE)	Very Low Food Security % (SE)
Breastfeeding takes too much time	14.7 (0.9)	13.5 (1.2)	16.5 (1.6)	15.3 (1.8)
Breastfeeding ties you down[b]	17.3 (0.9)	14.9 (1.2)	20.2 (1.6)	19.7 (2.0)
Breastfeeding means no one else can feed your baby	50.8 (1.8)	50.1 (2.0)	52.2 (2.9)	50.2 (3.0)
Breastfeeding is painful[b]	43.6 (1.0)	41.2 (1.3)	46.9 (2.0)	44.4 (2.3)
Breastmilk leaking onto your clothes is something I worry about[b]	27.4 (1.5)	23.4 (1.6)	30.6 (1.9)	33.9 (3.7)
With bottle feeding, the mother knows that the baby is getting enough to eat	67.0 (0.8)	68.0 (1.5)	64.9 (1.5)	68.0 (2.1)
Breastfeeding in public is not something I want to do[b]	36.9 (1.5)	33.5 (1.8)	40.2 (2.4)	41.4 (2.3)
Unwgt n[a]	2,649	1,364	832	453
Wgt n	395,398	205,864	125,080	64,455

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of food security differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18g through KA18m.

Table C-2e. Percentage of prenatal mothers agreeing with statements about perceived barriers to breastfeeding by participation in non-WIC benefit program(s)

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Participation in non-WIC Benefit Program(s)		
		Does not Participate in Any Other Program % (SE)	Participates in Other Program and Is On SNAP % (SE)	Participates in Other Programs and Is Not On SNAP % (SE)
Breastfeeding takes too much time	14.7 (0.9)	12.7 (2.2)	16.2 (1.1)	13.6 (1.3)
Breastfeeding ties you down	17.3 (0.9)	13.7 (1.9)	19.3 (1.6)	16.3 (1.5)
Breastfeeding means no one else can feed your baby[b]	50.8 (1.8)	44.5 (3.8)	53.6 (2.2)	50.0 (2.5)
Breastfeeding is painful[b]	43.6 (1.0)	38.4 (2.3)	48.0 (1.7)	39.9 (1.8)
Breastmilk leaking onto your clothes is something I worry about[b]	27.4 (1.5)	25.0 (2.4)	29.8 (1.7)	25.2 (2.0)
With bottle feeding, the mother knows that the baby is getting enough to eat	67.0 (0.8)	65.3 (3.2)	69.3 (1.5)	64.7 (1.4)
Breastfeeding in public is not something I want to do	36.9 (1.5)	31.7 (2.7)	39.6 (1.9)	35.7 (2.6)
Unwgt n[a]	2,649	422	1,300	927
Wgt n	395,398	67,072	190,413	137,913

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of participation in non-WIC benefit program(s) differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18g through KA18m.

Table C-2f. Percentage of prenatal mothers agreeing with statements about perceived barriers to breastfeeding by parity

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Parity		
		First Born % (SE)	Second Born % (SE)	Third or Subsequent Born % (SE)
Breastfeeding takes too much time[b]	14.7 (0.9)	11.9 (1.3)	15.2 (2.0)	18.1 (1.5)
Breastfeeding ties you down[b]	17.3 (0.9)	13.3 (1.2)	18.1 (1.8)	22.1 (1.7)
Breastfeeding means no one else can feed your baby	50.8 (1.8)	51.4 (2.1)	50.5 (2.2)	50.2 (2.8)
Breastfeeding is painful[b]	43.6 (1.0)	33.4 (1.6)	45.5 (1.7)	55.5 (2.2)
Breastmilk leaking onto your clothes is something I worry about	27.4 (1.5)	28.2 (1.9)	26.3 (1.8)	27.3 (2.7)
With bottle feeding, the mother knows that the baby is getting enough to eat[b]	67.0 (0.8)	60.3 (1.3)	74.5 (2.0)	69.3 (2.3)
Breastfeeding in public is not something I want to do	36.9 (1.5)	37.8 (2.4)	39.1 (2.3)	33.7 (1.9)
Unwgt n[a]	2,649	1,116	738	795
Wgt n	395,398	163,955	110,742	120,702

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of parity differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18g through KA18m.

Table C-2g. Percentage of prenatal mothers agreeing with statements about perceived barriers to breastfeeding by timing of WIC enrollment

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Timing of WIC Enrollment		
		1st Trimester % (SE)	2nd Trimester % (SE)	3rd Trimester % (SE)
Breastfeeding takes too much time	14.7 (0.9)	14.6 (1.5)	13.6 (1.2)	17.9 (1.8)
Breastfeeding ties you down	17.3 (0.9)	15.8 (1.3)	16.9 (1.2)	21.9 (2.7)
Breastfeeding means no one else can feed your baby[b]	50.8 (1.8)	53.8 (2.6)	51.4 (1.8)	42.4 (3.8)
Breastfeeding is painful	43.6 (1.0)	45.3 (1.7)	43.3 (1.3)	40.4 (2.7)
Breastmilk leaking onto your clothes is something I worry about	27.4 (1.5)	27.4 (1.6)	28.1 (2.0)	25.8 (2.9)
With bottle feeding, the mother knows that the baby is getting enough to eat	67.0 (0.8)	64.6 (1.7)	67.3 (1.4)	71.8 (2.8)
Breastfeeding in public is not something I want to do	36.9 (1.5)	35.1 (2.1)	39.1 (1.8)	35.4 (2.8)
Unwgt n[a]	2,649	1,045	1,223	381
Wgt n	395,398	149,891	177,447	68,060

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of timing of WIC enrollment differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18g through KA18m.

Table C-2h. Percentage of prenatal mothers agreeing with statements about perceived barriers to breastfeeding by weight status of mother before pregnancy

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Weight Status of Mother Before Pregnancy		
		Normal and Underweight % (SE)	Overweight % (SE)	Obese % (SE)
Breastfeeding takes too much time	14.7 (0.9)	14.2 (1.4)	15.8 (1.4)	14.5 (1.5)
Breastfeeding ties you down	17.3 (0.9)	17.4 (1.1)	19.0 (2.3)	15.8 (1.5)
Breastfeeding means no one else can feed your baby	50.8 (1.8)	50.5 (2.3)	49.6 (2.8)	52.2 (2.5)
Breastfeeding is painful	43.6 (1.0)	43.2 (1.4)	42.2 (2.1)	45.2 (2.1)
Breastmilk leaking onto your clothes is something I worry about	27.4 (1.5)	27.8 (1.7)	26.4 (1.8)	27.6 (2.4)
With bottle feeding, the mother knows that the baby is getting enough to eat	67.0 (0.8)	66.5 (1.7)	66.7 (1.9)	68.2 (1.8)
Breastfeeding in public is not something I want to do	36.9 (1.5)	39.5 (2.2)	35.6 (2.4)	34.0 (1.8)
Unwgt n[a]	2,649	1,229	648	772
Wgt n	395,398	181,970	98,494	114,935

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of weight status of mother before pregnancy differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18g through KA18m.

Table C-2i. Percentage of prenatal mothers agreeing with statements about perceived barriers to breastfeeding by income poverty

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Income Poverty		
		75% of Poverty Guideline or Below % (SE)	Above 75% But No More Than 130% of Poverty Guideline % (SE)	Above 130% of Poverty Guideline % (SE)
Breastfeeding takes too much time	14.7 (0.9)	14.9 (1.0)	14.9 (1.8)	13.1 (2.9)
Breastfeeding ties you down	17.3 (0.9)	17.7 (1.1)	18.0 (1.7)	13.5 (2.6)
Breastfeeding means no one else can feed your baby[b]	50.8 (1.8)	56.1 (1.7)	44.1 (3.1)	35.1 (2.8)
Breastfeeding is painful	43.6 (1.0)	45.2 (1.4)	40.8 (2.0)	40.4 (3.8)
Breastmilk leaking onto your clothes is something I worry about[b]	27.4 (1.5)	29.4 (1.8)	23.9 (1.6)	24.0 (3.7)
With bottle feeding, the mother knows that the baby is getting enough to eat	67.0 (0.8)	67.7 (1.2)	64.7 (1.7)	69.2 (3.5)
Breastfeeding in public is not something I want to do	36.9 (1.5)	38.4 (1.8)	35.7 (2.1)	30.8 (3.8)
Unwgt n[a]	2,649	1,671	736	242
Wgt n	395,398	248,938	107,512	38,949

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of income poverty differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18g through KA18m.

Table C-2j. Percentage of prenatal mothers agreeing with statements about perceived barriers to breastfeeding by breastfeeding history

Maternal Attitudes and Beliefs	All Prenatal Mothers % (SE)	Breastfeeding History		
		No History (includes first-time mothers) % (SE)	Three or Less Months % (SE)	More Than Three Months % (SE)
Breastfeeding takes too much time[b]	14.7 (0.9)	13.2 (1.1)	19.8 (2.0)	13.5 (1.5)
Breastfeeding ties you down[b]	17.3 (0.9)	14.8 (1.2)	21.6 (2.2)	18.7 (1.6)
Breastfeeding means no one else can feed your baby	50.8 (1.8)	51.0 (2.0)	48.3 (2.7)	52.5 (2.9)
Breastfeeding is painful[b]	43.6 (1.0)	35.6 (1.3)	59.0 (2.3)	46.3 (2.8)
Breastmilk leaking onto your clothes is something I worry about	27.4 (1.5)	28.3 (1.6)	28.5 (2.9)	24.7 (2.2)
With bottle feeding, the mother knows that the baby is getting enough to eat[b]	67.0 (0.8)	64.6 (1.3)	78.1 (1.7)	62.6 (1.9)
Breastfeeding in public is not something I want to do[b]	36.9 (1.5)	40.9 (2.2)	39.9 (2.5)	26.7 (2.2)
Unwgt n[a]	2,649	1,408	562	679
Wgt n	395,398	205,156	86,110	104,133

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of breastfeeding history differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA18g through KA18m.

Table C-3a. Percentage of prenatal mothers aware of WIC program elements and received select services by race

WIC Program Awareness and Utilization	All Prenatal Mothers % (SE)	Race		
		Black or African American % (SE)	White % (SE)	Other % (SE)
Feeding method WIC recommends[b]				
Breastfeeding only	40.7 (1.8)	27.1 (1.8)	44.4 (2.0)	43.7 (2.6)
Formula feeding only	0.5 (0.2)	1.2 (0.7)	0.2 (0.1)	0.5 (0.3)
Both are equally ok	57.9 (1.7)	70.4 (2.1)	54.3 (1.9)	55.5 (2.6)
Don't Know	0.9 (0.2)	1.2 (0.5)	1.0 (0.3)	0.3 (0.3)
Exclusive breastfeeding package offered at WIC clinic				
Yes	63.5 (1.7)	62.0 (3.8)	64.4 (1.9)	62.3 (3.1)
No	5.4 (0.6)	4.7 (1.1)	4.9 (0.7)	7.7 (1.4)
Don't Know	31.1 (1.4)	33.3 (3.3)	30.7 (1.8)	30.0 (2.5)
Amount of infant formula varies with age of baby				
Yes	49.1 (1.4)	47.6 (2.8)	48.7 (1.5)	51.5 (3.0)
No	8.0 (0.6)	8.6 (1.1)	7.3 (0.7)	9.4 (2.4)
Don't Know	42.9 (1.3)	43.8 (2.3)	44.0 (1.6)	39.0 (2.7)
Amount of infant formula varies with how much breastfeeding[b]				
Yes	51.8 (1.7)	46.0 (2.7)	52.1 (2.0)	56.9 (3.3)
No	6.8 (0.6)	6.7 (1.1)	6.4 (0.7)	8.2 (1.4)
Don't Know	41.4 (1.6)	47.3 (2.5)	41.5 (2.0)	35.0 (3.5)
Received breastfeeding information				
Yes	71.7 (1.8)	79.9 (2.8)	71.4 (2.0)	64.2 (2.8)
No	27.8 (1.8)	20.1 (2.8)	27.9 (2.0)	35.2 (2.9)
Don't Know	0.5 (0.1)		0.6 (0.2)	0.6 (0.5)
Received information on eating				
Yes	91.8 (0.7)	95.3 (1.1)	90.5 (0.8)	92.0 (1.5)
No	8.0 (0.7)	4.7 (1.1)	9.3 (0.8)	7.6 (1.5)
Don't Know	0.2 (0.1)		0.2 (0.1)	0.5 (0.5)
Unwgt n[a]	2,649	582	1,606	461
Wgt n	395,398	82,231	230,878	82,289

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.

[b] Chi-square statistic testing of race differences is significant at $p \leq 0.05$.

Data source: Prenatal interview questions WC1, WC2, WC3, WC4, WC5 and WC6.

Table C-3b. Percentage of prenatal mothers aware of WIC program elements and received select services by ethnicity

WIC Program Awareness and Utilization	All Prenatal Mothers % (SE)	Ethnicity	
		Hispanic % (SE)	Non-Hispanic % (SE)
Feeding method WIC recommends[b]			
Breastfeeding only	40.7 (1.8)	47.8 (2.3)	34.3 (1.9)
Formula feeding only	0.5 (0.2)	0.4 (0.2)	0.6 (0.3)
Both are equally ok	57.9 (1.7)	51.0 (2.2)	64.1 (1.9)
Don't Know	0.9 (0.2)	0.8 (0.3)	1.0 (0.2)
Exclusive breastfeeding package offered at WIC clinic[b]			
Yes	63.5 (1.7)	66.3 (2.4)	60.9 (2.0)
No	5.4 (0.6)	5.8 (0.9)	5.1 (0.8)
Don't Know	31.1 (1.4)	27.9 (2.0)	34.0 (1.7)
Amount of infant formula varies with age of baby[b]			
Yes	49.1 (1.4)	54.2 (1.9)	44.5 (1.7)
No	8.0 (0.6)	7.8 (0.8)	8.3 (0.9)
Don't Know	42.9 (1.3)	38.1 (2.1)	47.2 (1.7)
Amount of infant formula varies with how much breastfeeding[b]			
Yes	51.8 (1.7)	59.5 (2.1)	45.0 (2.0)
No	6.8 (0.6)	6.9 (0.9)	6.7 (0.7)
Don't Know	41.4 (1.6)	33.6 (2.2)	48.3 (1.9)
Received breastfeeding information[b]			
Yes	71.7 (1.8)	65.5 (2.1)	77.2 (2.1)
No	27.8 (1.8)	34.3 (2.2)	22.0 (2.1)
Don't Know	0.5 (0.1)	0.2 (0.1)	0.8 (0.2)
Received information on eating			
Yes	91.8 (0.7)	91.3 (1.0)	92.2 (1.0)
No	8.0 (0.7)	8.4 (0.9)	7.6 (1.0)
Don't Know	0.2 (0.1)	0.2 (0.2)	0.2 (0.1)
Unwgt n[a]	2,649	1,089	1,560
Wgt n	395,398	186,511	208,887

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of ethnicity differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions WC1, WC2, WC3, WC4, WC5 and WC6.

Table C-3c. Percentage of prenatal mothers aware of WIC program elements and received select services by current marital status

WIC Program Awareness and Utilization	All Prenatal Mothers % (SE)	Current Marital Status of Mother	
		Married % (SE)	Not Married (includes divorced and widowed) % (SE)
Feeding method WIC recommends[b]			
Breastfeeding only	40.7 (1.8)	49.2 (2.5)	36.8 (1.9)
Formula feeding only	0.5 (0.2)	0.5 (0.3)	0.5 (0.2)
Both are equally ok	57.9 (1.7)	48.9 (2.5)	62.0 (1.8)
Don't Know	0.9 (0.2)	1.4 (0.5)	0.7 (0.2)
Exclusive breastfeeding package offered at WIC clinic			
Yes	63.5 (1.7)	65.6 (2.4)	62.5 (1.9)
No	5.4 (0.6)	5.8 (1.0)	5.3 (0.6)
Don't Know	31.1 (1.4)	28.6 (2.2)	32.2 (1.5)
Amount of infant formula varies with age of baby			
Yes	49.1 (1.4)	48.5 (2.2)	49.3 (1.6)
No	8.0 (0.6)	7.7 (0.9)	8.2 (0.7)
Don't Know	42.9 (1.3)	43.8 (2.1)	42.5 (1.5)
Amount of infant formula varies with how much breastfeeding[b]			
Yes	51.8 (1.7)	55.8 (2.3)	50.1 (1.9)
No	6.8 (0.6)	5.1 (0.9)	7.6 (0.8)
Don't Know	41.4 (1.6)	39.1 (2.5)	42.4 (1.8)
Received breastfeeding information			
Yes	71.7 (1.8)	69.9 (2.5)	72.5 (2.0)
No	27.8 (1.8)	29.6 (2.6)	27.0 (2.0)
Don't Know	0.5 (0.1)	0.5 (0.4)	0.5 (0.2)
Received information on eating			
Yes	91.8 (0.7)	90.8 (1.3)	92.2 (0.9)
No	8.0 (0.7)	8.9 (1.3)	7.6 (0.9)
Don't Know	0.2 (0.1)	0.3 (0.2)	0.2 (0.2)
Unwgt n[a]	2,649	792	1,857
Wgt n	395,398	122,642	272,756

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of marital status of mother differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions WC1, WC2, WC3, WC4, WC5 and WC6.

Table C-3d. Percentage of prenatal mothers aware of WIC program elements and received select services by food security (measured using 6-item module)

WIC Program Awareness and Utilization	All Prenatal Mothers % (SE)	Food Security (measured using 6-item module)		
		High or Marginal Food Security % (SE)	Low Food Security % (SE)	Very Low Food Security % (SE)
Feeding method WIC recommends				
Breastfeeding only	40.7 (1.8)	40.6 (2.0)	40.2 (2.4)	41.8 (2.9)
Formula feeding only	0.5 (0.2)	0.5 (0.2)	0.1 (0.1)	1.1 (0.8)
Both are equally ok	57.9 (1.7)	58.0 (2.0)	59.0 (2.3)	55.7 (2.6)
Don't Know	0.9 (0.2)	0.9 (0.3)	0.7 (0.3)	1.3 (0.7)
Exclusive breastfeeding package offered at WIC clinic				
Yes	63.5 (1.7)	63.3 (2.0)	63.0 (1.9)	65.2 (3.6)
No	5.4 (0.6)	5.5 (0.6)	5.7 (1.0)	4.5 (1.3)
Don't Know	31.1 (1.4)	31.2 (1.7)	31.2 (1.7)	30.3 (3.3)
Amount of infant formula varies with age of baby				
Yes	49.1 (1.4)	48.2 (1.7)	50.6 (2.0)	48.8 (3.2)
No	8.0 (0.6)	9.3 (0.9)	7.0 (0.9)	6.1 (1.3)
Don't Know	42.9 (1.3)	42.5 (1.5)	42.5 (2.2)	45.1 (3.0)
Amount of infant formula varies with how much breastfeeding				
Yes	51.8 (1.7)	52.2 (2.2)	52.1 (2.3)	50.0 (2.9)
No	6.8 (0.6)	7.9 (0.9)	5.6 (0.8)	5.8 (1.1)
Don't Know	41.4 (1.6)	39.9 (2.0)	42.4 (2.3)	44.2 (3.1)
Received breastfeeding information				
Yes	71.7 (1.8)	71.7 (1.7)	71.7 (2.5)	71.7 (3.7)
No	27.8 (1.8)	28.0 (1.8)	27.7 (2.5)	27.1 (3.6)
Don't Know	0.5 (0.1)	0.2 (0.2)	0.6 (0.3)	1.2 (0.5)
Received information on eating				
Yes	91.8 (0.7)	92.7 (0.7)	90.7 (1.3)	90.9 (2.0)
No	8.0 (0.7)	7.1 (0.7)	8.9 (1.2)	9.1 (2.0)
Don't Know	0.2 (0.1)	0.2 (0.1)	0.3 (0.3)	
Unwgt n[a]	2,649	1,364	832	453
Wgt n	395,398	205,864	125,080	64,455

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of food security differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions WC1, WC2, WC3, WC4, WC5 and WC6.

Table C-3e. Percentage of prenatal mothers aware of WIC program elements and received select services by participation in non-WIC benefit program(s)

WIC Program Awareness and Utilization	All Prenatal Mothers % (SE)	Participation in non-WIC Benefit Program(s)		
		Does not Participate in Any Other Program % (SE)	Participates in Other Program and Is On SNAP % (SE)	Participates in Other Programs and Is Not On SNAP % (SE)
Feeding method WIC recommends				
Breastfeeding only	40.7 (1.8)	45.3 (3.1)	41.5 (2.1)	37.3 (2.1)
Formula feeding only	0.5 (0.2)		0.8 (0.4)	0.3 (0.2)
Both are equally ok	57.9 (1.7)	54.4 (3.2)	57.0 (1.9)	60.9 (2.2)
Don't Know	0.9 (0.2)	0.3 (0.2)	0.7 (0.2)	1.5 (0.5)
Exclusive breastfeeding package offered at WIC clinic				
Yes	63.5 (1.7)	59.8 (3.6)	64.5 (2.1)	63.9 (2.1)
No	5.4 (0.6)	4.7 (1.0)	5.7 (0.8)	5.4 (1.0)
Don't Know	31.1 (1.4)	35.5 (3.3)	29.8 (1.8)	30.7 (1.7)
Amount of infant formula varies with age of baby[b]				
Yes	49.1 (1.4)	43.6 (2.6)	53.8 (2.2)	45.2 (1.8)
No	8.0 (0.6)	5.8 (1.4)	9.8 (1.0)	6.6 (1.0)
Don't Know	42.9 (1.3)	50.6 (2.5)	36.4 (2.1)	48.2 (1.8)
Amount of infant formula varies with how much breastfeeding[b]				
Yes	51.8 (1.7)	47.4 (3.9)	52.4 (2.4)	53.2 (2.3)
No	6.8 (0.6)	3.7 (0.9)	7.9 (0.9)	6.8 (0.9)
Don't Know	41.4 (1.6)	48.9 (3.8)	39.7 (2.3)	40.0 (2.1)
Received breastfeeding information				
Yes	71.7 (1.8)	68.8 (3.3)	73.3 (2.1)	70.9 (2.4)
No	27.8 (1.8)	31.2 (3.3)	26.0 (2.1)	28.6 (2.4)
Don't Know	0.5 (0.1)		0.7 (0.3)	0.5 (0.3)
Received information on eating				
Yes	91.8 (0.7)	90.7 (1.3)	91.5 (0.9)	92.7 (1.1)
No	8.0 (0.7)	9.1 (1.2)	8.2 (0.9)	7.1 (1.1)
Don't Know	0.2 (0.1)	0.2 (0.2)	0.3 (0.2)	0.2 (0.1)
Unwgt n[a]	2,649	422	1,300	927
Wgt n	395,398	67,072	190,413	137,913

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of participation in non-WIC benefit program(s) differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions WC1, WC2, WC3, WC4, WC5 and WC6.

Table C-3f. Percentage of prenatal mothers aware of WIC program elements and received select services by parity

WIC Program Awareness and Utilization	All Prenatal Mothers % (SE)	Parity		
		First Born % (SE)	Second Born % (SE)	Third or Subsequent Born % (SE)
Feeding method WIC recommends				
Breastfeeding only	40.7 (1.8)	37.5 (2.2)	40.9 (2.1)	44.7 (2.1)
Formula feeding only	0.5 (0.2)	0.4 (0.3)	0.5 (0.2)	0.7 (0.4)
Both are equally ok	57.9 (1.7)	61.0 (2.2)	57.4 (2.1)	54.2 (2.2)
Don't Know	0.9 (0.2)	1.1 (0.3)	1.2 (0.5)	0.5 (0.2)
Exclusive breastfeeding package offered at WIC clinic [b]				
Yes	63.5 (1.7)	59.5 (2.4)	66.4 (2.8)	66.3 (1.9)
No	5.4 (0.6)	6.1 (0.9)	4.2 (0.7)	5.6 (1.1)
Don't Know	31.1 (1.4)	34.4 (2.2)	29.4 (2.6)	28.1 (1.7)
Amount of infant formula varies with age of baby[b]				
Yes	49.1 (1.4)	35.9 (2.3)	56.2 (2.3)	60.4 (1.9)
No	8.0 (0.6)	6.0 (0.8)	8.5 (1.3)	10.3 (1.0)
Don't Know	42.9 (1.3)	58.2 (2.2)	35.3 (2.3)	29.2 (2.0)
Amount of infant formula varies with how much breastfeeding[b]				
Yes	51.8 (1.7)	41.7 (2.6)	54.2 (2.8)	63.3 (2.1)
No	6.8 (0.6)	6.9 (0.8)	7.3 (1.0)	6.2 (1.1)
Don't Know	41.4 (1.6)	51.4 (2.4)	38.4 (2.6)	30.4 (2.0)
Received breastfeeding information[b]				
Yes	71.7 (1.8)	74.6 (2.3)	68.5 (2.2)	70.8 (2.4)
No	27.8 (1.8)	25.2 (2.3)	31.1 (2.2)	28.2 (2.5)
Don't Know	0.5 (0.1)	0.2 (0.1)	0.4 (0.2)	1.1 (0.3)
Received information on eating				
Yes	91.8 (0.7)	92.5 (1.0)	92.2 (0.9)	90.4 (1.1)
No	8.0 (0.7)	7.3 (1.0)	7.6 (0.9)	9.4 (1.1)
Don't Know	0.2 (0.1)	0.2 (0.2)	0.2 (0.2)	0.2 (0.1)
Unwgt n[a]	2,649	1,116	738	795
Wgt n	395,398	163,955	110,742	120,702

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.

[b] Chi-square statistic testing of parity differences is significant at $p \leq 0.05$.

Data source: Prenatal interview questions WC1, WC2, WC3, WC4, WC5 and WC6.

Table C-3g. Percentage of prenatal mothers aware of WIC program elements and received select services by timing of WIC enrollment

WIC Program Awareness and Utilization	All Prenatal Mothers % (SE)	Timing of WIC Enrollment		
		1st Trimester % (SE)	2nd Trimester % (SE)	3rd Trimester % (SE)
Feeding method WIC recommends				
Breastfeeding only	40.7 (1.8)	43.0 (2.2)	40.1 (2.2)	37.0 (3.2)
Formula feeding only	0.5 (0.2)	0.3 (0.2)	0.3 (0.2)	1.3 (0.9)
Both are equally ok	57.9 (1.7)	55.8 (2.3)	58.6 (2.2)	60.9 (3.1)
Don't Know	0.9 (0.2)	0.9 (0.3)	0.9 (0.4)	0.8 (0.5)
Exclusive breastfeeding package offered at WIC clinic				
Yes	63.5 (1.7)	67.1 (2.3)	62.2 (2.5)	59.0 (3.7)
No	5.4 (0.6)	4.6 (0.8)	5.9 (1.1)	6.1 (1.7)
Don't Know	31.1 (1.4)	28.4 (1.9)	31.9 (1.9)	35.0 (2.8)
Amount of infant formula varies with age of baby				
Yes	49.1 (1.4)	49.8 (2.4)	49.2 (2.1)	47.0 (2.7)
No	8.0 (0.6)	8.0 (0.8)	9.1 (1.0)	5.3 (1.4)
Don't Know	42.9 (1.3)	42.2 (1.9)	41.7 (1.7)	47.7 (3.0)
Amount of infant formula varies with how much breastfeeding[b]				
Yes	51.8 (1.7)	55.3 (2.3)	50.8 (2.1)	47.0 (3.0)
No	6.8 (0.6)	7.6 (1.0)	7.7 (0.8)	2.7 (0.7)
Don't Know	41.4 (1.6)	37.1 (2.4)	41.5 (2.0)	50.3 (2.9)
Received breastfeeding information				
Yes	71.7 (1.8)	69.7 (2.1)	70.6 (2.6)	78.9 (2.4)
No	27.8 (1.8)	29.7 (2.1)	28.8 (2.6)	21.1 (2.4)
Don't Know	0.5 (0.1)	0.6 (0.3)	0.6 (0.3)	
Received information on eating				
Yes	91.8 (0.7)	91.8 (0.9)	92.0 (0.8)	91.1 (1.8)
No	8.0 (0.7)	7.7 (0.9)	8.0 (0.8)	8.6 (1.8)
Don't Know	0.2 (0.1)	0.5 (0.3)		0.3 (0.2)
Unwgt n[a]	2,649	1,045	1,223	381
Wgt n	395,398	149,891	177,447	68,060

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of timing of WIC enrollment differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions WC1, WC2, WC3, WC4, WC5 and WC6.

Table C-3h. Percentage of prenatal mothers aware of WIC program elements and received select services by weight status of mother before pregnancy

WIC Program Awareness and Utilization	All Prenatal Mothers % (SE)	Weight Status of Mother Before Pregnancy		
		Normal and Underweight % (SE)	Overweight % (SE)	Obese % (SE)
Feeding method WIC recommends				
Breastfeeding only	40.7 (1.8)	39.6 (2.2)	39.8 (2.7)	43.1 (2.3)
Formula feeding only	0.5 (0.2)	0.4 (0.2)	0.5 (0.4)	0.6 (0.5)
Both are equally ok	57.9 (1.7)	58.6 (2.2)	59.3 (2.8)	55.6 (2.2)
Don't Know	0.9 (0.2)	1.3 (0.4)	0.4 (0.2)	0.8 (0.2)
Exclusive breastfeeding package offered at WIC clinic				
Yes	63.5 (1.7)	62.4 (2.2)	61.8 (2.9)	66.6 (1.8)
No	5.4 (0.6)	6.5 (0.9)	5.7 (1.0)	3.5 (0.8)
Don't Know	31.1 (1.4)	31.0 (1.8)	32.5 (2.7)	29.9 (1.9)
Amount of infant formula varies with age of baby				
Yes	49.1 (1.4)	47.1 (1.6)	51.7 (2.0)	49.8 (2.7)
No	8.0 (0.6)	7.4 (1.1)	8.0 (1.1)	9.1 (1.3)
Don't Know	42.9 (1.3)	45.5 (1.5)	40.2 (1.8)	41.1 (2.4)
Amount of infant formula varies with how much breastfeeding				
Yes	51.8 (1.7)	48.9 (2.1)	56.3 (2.6)	52.6 (2.5)
No	6.8 (0.6)	7.9 (1.0)	5.6 (1.1)	6.1 (0.9)
Don't Know	41.4 (1.6)	43.2 (2.0)	38.1 (2.2)	41.3 (2.6)
Received breastfeeding information				
Yes	71.7 (1.8)	71.8 (2.2)	71.3 (2.4)	71.8 (2.7)
No	27.8 (1.8)	27.5 (2.2)	28.5 (2.4)	27.7 (2.7)
Don't Know	0.5 (0.1)	0.7 (0.2)	0.3 (0.2)	0.5 (0.2)
Received information on eating				
Yes	91.8 (0.7)	93.1 (0.8)	90.4 (1.3)	90.9 (1.0)
No	8.0 (0.7)	6.8 (0.8)	9.5 (1.3)	8.6 (1.0)
Don't Know	0.2 (0.1)	0.1 (0.1)	0.1 (0.1)	0.5 (0.4)
Unwgt n[a]	2,649	1,229	648	772
Wgt n	395,398	181,970	98,494	114,935

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of weight status of mother before pregnancy differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions WC1, WC2, WC3, WC4, WC5 and WC6.

Table C-3i. Percentage of prenatal mothers aware of WIC program elements and received select services by income poverty

WIC Program Awareness and Utilization	All Prenatal Mothers % (SE)	Income Poverty		
		75% of Poverty Guideline or Below % (SE)	Above 75% But No More Than 130% of Poverty Guideline	Above 130% of Poverty Guideline % (SE)
Feeding method WIC recommends				
Breastfeeding only	40.7 (1.8)	39.6 (2.1)	41.9 (2.4)	43.9 (4.2)
Formula feeding only	0.5 (0.2)	0.8 (0.3)		
Both are equally ok	57.9 (1.7)	58.5 (2.0)	57.5 (2.5)	55.5 (4.4)
Don't Know	0.9 (0.2)	1.1 (0.3)	0.6 (0.3)	0.6 (0.4)
Exclusive breastfeeding package offered at WIC clinic[b]				
Yes	63.5 (1.7)	65.7 (2.0)	59.5 (2.1)	60.2 (5.3)
No	5.4 (0.6)	5.9 (0.8)	4.3 (0.8)	5.2 (2.1)
Don't Know	31.1 (1.4)	28.3 (1.6)	36.1 (1.9)	34.6 (4.3)
Amount of infant formula varies with age of baby[b]				
Yes	49.1 (1.4)	52.9 (1.8)	44.0 (2.1)	38.4 (4.2)
No	8.0 (0.6)	8.7 (0.8)	7.1 (1.1)	6.1 (1.8)
Don't Know	42.9 (1.3)	38.4 (1.6)	48.9 (2.2)	55.6 (4.0)
Amount of infant formula varies with how much breastfeeding				
Yes	51.8 (1.7)	53.7 (2.0)	48.4 (2.7)	49.3 (4.6)
No	6.8 (0.6)	7.4 (0.8)	6.0 (0.9)	5.3 (1.7)
Don't Know	41.4 (1.6)	38.9 (2.1)	45.6 (2.7)	45.5 (4.1)
Received breastfeeding information				
Yes	71.7 (1.8)	71.7 (2.2)	71.6 (2.6)	71.7 (4.4)
No	27.8 (1.8)	27.8 (2.2)	27.6 (2.6)	28.0 (4.3)
Don't Know	0.5 (0.1)	0.4 (0.2)	0.8 (0.3)	0.3 (0.3)
Received information on eating				
Yes	91.8 (0.7)	92.4 (1.1)	91.2 (1.4)	89.4 (2.2)
No	8.0 (0.7)	7.4 (1.0)	8.6 (1.4)	10.1 (2.2)
Don't Know	0.2 (0.1)	0.2 (0.2)	0.2 (0.1)	0.5 (0.5)
Unwgt n[a]	2,649	1,671	736	242
Wgt n	395,398	248,938	107,512	38,949

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of income poverty differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions WC1, WC2, WC3, WC4, WC5 and WC6.

Table C-3j. Percentage of prenatal mothers aware of WIC program elements and received select services by breastfeeding history

WIC Program Awareness and Utilization	All Prenatal Mothers % (SE)	Breastfeeding History		
		No History (includes first-time mothers) % (SE)	Three or Less Months % (SE)	More Than Three Months % (SE)
Feeding method WIC recommends[b]				
Breastfeeding only	40.7 (1.8)	35.2 (2.0)	44.3 (2.7)	48.4 (2.6)
Formula feeding only	0.5 (0.2)	0.4 (0.3)	0.3 (0.2)	0.7 (0.4)
Both are equally ok	57.9 (1.7)	63.4 (1.9)	54.2 (2.8)	50.3 (2.6)
Don't Know	0.9 (0.2)	0.9 (0.3)	1.1 (0.5)	0.7 (0.4)
Exclusive breastfeeding package offered at WIC clinic [b]				
Yes	63.5 (1.7)	60.2 (2.0)	63.4 (2.6)	70.1 (2.7)
No	5.4 (0.6)	5.7 (0.7)	4.9 (1.1)	5.3 (1.3)
Don't Know	31.1 (1.4)	34.1 (1.8)	31.6 (2.3)	24.6 (2.0)
Amount of infant formula varies with age of baby[b]				
Yes	49.1 (1.4)	40.0 (1.9)	64.7 (2.0)	54.0 (2.4)
No	8.0 (0.6)	7.1 (0.9)	9.7 (1.4)	8.5 (1.4)
Don't Know	42.9 (1.3)	52.9 (1.7)	25.6 (2.2)	37.5 (1.9)
Amount of infant formula varies with how much breastfeeding[b]				
Yes	51.8 (1.7)	42.7 (2.3)	61.3 (2.4)	61.8 (1.8)
No	6.8 (0.6)	6.9 (0.8)	6.5 (1.4)	6.9 (1.1)
Don't Know	41.4 (1.6)	50.4 (2.1)	32.2 (2.3)	31.2 (2.0)
Received breastfeeding information				
Yes	71.7 (1.8)	74.2 (2.1)	72.3 (2.8)	66.3 (2.3)
No	27.8 (1.8)	25.4 (2.1)	27.1 (2.8)	33.0 (2.3)
Don't Know	0.5 (0.1)	0.4 (0.2)	0.6 (0.4)	0.6 (0.4)
Received information on eating				
Yes	91.8 (0.7)	91.7 (1.0)	91.5 (1.4)	92.1 (1.0)
No	8.0 (0.7)	8.0 (1.0)	8.5 (1.4)	7.6 (1.0)
Don't Know	0.2 (0.1)	0.3 (0.2)		0.3 (0.2)
Unwgt n[a]	2,649	1,408	562	679
Wgt n	395,398	205,156	86,110	104,133

[a] n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
[b] Chi-square statistic testing of breastfeeding history differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions WC1, WC2, WC3, WC4, WC5 and WC6.

Table C-4a. Percentage of prenatal mothers by infant feeding intention (IFI) scale and race

IFI Scale	All Prenatal Mothers % (SE)	Race[b]		
		Black or African American % (SE)	White % (SE)	Other % (SE)
0 – 3.5	3.9 (0.6)	7.0 (1.1)	3.5 (0.6)	2.2 (0.9)
4 – 7.5	22.2 (1.3)	27.3 (2.4)	21.9 (1.6)	17.8 (2.6)
8 – 11.5	38.9 (1.3)	33.4 (2.7)	39.4 (1.5)	42.7 (2.3)
12 – 15.5	29.0 (1.5)	27.6 (2.8)	28.6 (1.9)	31.3 (1.4)
16	6.0 (0.6)	4.6 (1.1)	6.6 (0.8)	5.9 (1.6)
Unwgt n[a]	2,581	562	1,564	455
Wgt n	385,931	79,958	224,699	81,274

[a] n is less than 2649 due to item nonresponse.
[b] Chi-square statistic testing of race differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA19a through KA19e.

Table C-4b. Percentage of prenatal mothers by infant feeding intention (IFI) scale and ethnicity

IFI Scale	All Prenatal Mothers % (SE)	Ethnicity[b]	
		Hispanic % (SE)	Non-Hispanic % (SE)
0 – 3.5	3.9 (0.6)	1.8 (0.6)	5.9 (0.7)
4 – 7.5	22.2 (1.3)	20.3 (1.7)	23.9 (1.9)
8 – 11.5	38.9 (1.3)	41.9 (1.7)	36.2 (1.6)
12 – 15.5	29.0 (1.5)	30.4 (2.0)	27.7 (1.6)
16	6.0 (0.6)	5.7 (0.9)	6.4 (1.0)
Unwgt n[a]	2,581	1,069	1,512
Wgt n	385,931	183,024	202,907

[a] n is less than 2649 due to item nonresponse.

[b] Chi-square statistic testing of ethnicity differences is significant at $p \leq 0.05$.

Data source: Prenatal interview questions KA19a through KA19e.

Table C-4c. Percentage of prenatal mothers by infant feeding intention (IFI) scale and current marital status of mother

IFI Scale	All Prenatal Mothers % (SE)	Current Marital Status of Mother[b]	
		Married % (SE)	Not Married (includes divorced and widowed) % (SE)
0 – 3.5	3.9 (0.6)	1.9 (0.6)	4.9 (0.7)
4 – 7.5	22.2 (1.3)	18.6 (2.2)	23.8 (1.6)
8 – 11.5	38.9 (1.3)	37.2 (1.9)	39.6 (1.5)
12 – 15.5	29.0 (1.5)	32.1 (2.7)	27.6 (1.5)
16	6.0 (0.6)	10.2 (1.6)	4.2 (0.4)
Unwgt n[a]	2,581	772	1,809
Wgt n	385,931	120,057	265,874

[a] n is less than 2649 due to item nonresponse.
[b] Chi-square statistic testing of marital status of mother differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA19a through KA19e.

Table C-4d. Percentage of prenatal mothers by infant feeding intention (IFI) scale and food security (measured using 6-item module)

IFI Scale	All Prenatal Mothers % (SE)	Food Security (measured using 6-item module)		
		High or Marginal Food Security % (SE)	Low Food Security % (SE)	Very Low Food Security % (SE)
0 – 3.5	3.9 (0.6)	3.4 (0.6)	5.0 (1.0)	3.7 (1.0)
4 – 7.5	22.2 (1.3)	22.8 (1.5)	21.7 (2.0)	21.2 (2.3)
8 – 11.5	38.9 (1.3)	39.9 (1.4)	37.2 (2.0)	38.6 (2.5)
12 – 15.5	29.0 (1.5)	27.5 (1.6)	31.3 (2.2)	29.2 (2.6)
16	6.0 (0.6)	6.4 (0.7)	4.8 (0.9)	7.2 (1.1)
Unwgt n[a]	2,581	1,326	811	444
Wgt n	385,931	200,994	121,613	63,324

[a] n is less than 2649 due to item nonresponse.
Data source: Prenatal interview questions KA19a through KA19e.

Table C-4e. Percentage of prenatal mothers by infant feeding intention (IFI) scale and participation in non-WIC benefit program(s)

IFI Scale	All Prenatal Mothers % (SE)	Participation in non-WIC Benefit Program(s)[b]		
		Does not Participate in Any Other Program % (SE)	Participates in Other Program and Is On SNAP % (SE)	Participates in Other Programs and Is Not On SNAP % (SE)
0 – 3.5	3.9 (0.6)	2.2 (1.0)	5.8 (0.8)	2.2 (0.6)
4 – 7.5	22.2 (1.3)	13.9 (1.5)	25.8 (1.6)	21.3 (2.4)
8 – 11.5	38.9 (1.3)	41.0 (3.5)	36.8 (1.8)	40.7 (2.0)
12 – 15.5	29.0 (1.5)	33.2 (2.6)	26.6 (1.7)	30.2 (2.5)
16	6.0 (0.6)	9.8 (1.7)	5.1 (0.8)	5.5 (0.9)
Unwgt n[a]	2,581	416	1,266	899
Wgt n	385,931	66,269	185,186	134,476

[a] n is less than 2649 due to item nonresponse.

[b] Chi-square statistic testing of participation in non-WIC benefit program(s) differences is significant at $p \leq 0.05$.

Data source: Prenatal interview questions KA19a through KA19e.

Table C-4f. Percentage of prenatal mothers by infant feeding intention (IFI) scale and parity

IFI Scale	All Prenatal Mothers % (SE)	Parity[b]		
		First Born % (SE)	Second Born % (SE)	Third or Subsequent Born % (SE)
0 – 3.5	3.9 (0.6)	2.8 (0.7)	4.2 (0.9)	5.2 (0.8)
4 – 7.5	22.2 (1.3)	18.9 (1.7)	23.3 (2.3)	25.5 (1.8)
8 – 11.5	38.9 (1.3)	38.9 (1.7)	41.4 (2.3)	36.5 (2.4)
12 – 15.5	29.0 (1.5)	33.2 (1.8)	24.9 (2.4)	27.0 (2.2)
16	6.0 (0.6)	6.1 (0.8)	6.2 (1.3)	5.8 (1.2)
Unwgt n[a]	2,581	1,082	719	780
Wgt n	385,931	159,044	108,250	118,637

[a] n is less than 2649 due to item nonresponse.

[b] Chi-square statistic testing of parity differences is significant at $p \leq 0.05$.

Data source: Prenatal interview questions KA19a through KA19e.

Table C-4g. Percentage of prenatal mothers by infant feeding intention (IFI) scale and timing of WIC enrollment

IFI Scale	All Prenatal Mothers % (SE)	Timing of WIC Enrollment[b]		
		1st Trimester % (SE)	2nd Trimester % (SE)	3rd Trimester % (SE)
0 – 3.5	3.9 (0.6)	2.7 (0.6)	3.5 (0.6)	7.8 (1.8)
4 – 7.5	22.2 (1.3)	18.9 (1.3)	23.1 (1.5)	27.1 (3.1)
8 – 11.5	38.9 (1.3)	41.1 (2.1)	39.0 (1.7)	33.5 (2.9)
12 – 15.5	29.0 (1.5)	29.8 (2.2)	29.0 (1.6)	27.0 (2.8)
16	6.0 (0.6)	7.5 (1.1)	5.3 (0.7)	4.7 (1.2)
Unwgt n[a]	2,581	1,019	1,192	370
Wgt n	385,931	146,353	173,268	66,309

[a] n is less than 2649 due to item nonresponse.

[b] Chi-square statistic testing of timing of WIC enrollment differences is significant at $p \leq 0.05$.

Data source: Prenatal interview questions KA19a through KA19e.

Table C-4h. Percentage of prenatal mothers by infant feeding intention (IFI) scale and weight status of mother before pregnancy

IFI Scale	All Prenatal Mothers % (SE)	Weight Status of Mother Before Pregnancy		
		Normal and Underweight % (SE)	Overweight % (SE)	Obese % (SE)
0 – 3.5	3.9 (0.6)	3.9 (0.7)	2.5 (0.7)	5.2 (1.1)
4 – 7.5	22.2 (1.3)	22.4 (1.8)	24.6 (2.2)	19.7 (1.5)
8 – 11.5	38.9 (1.3)	40.8 (1.6)	38.4 (2.6)	36.2 (2.5)
12 – 15.5	29.0 (1.5)	27.0 (1.6)	27.8 (2.4)	33.2 (2.7)
16	6.0 (0.6)	5.8 (0.8)	6.7 (1.1)	5.7 (0.9)
Unwgt n[a]	2,581	1,203	632	746
Wgt n	385,931	178,140	96,268	111,522

[a] n is less than 2649 due to item nonresponse.

Data source: Prenatal interview questions KA19a through KA19e.

Table C-4i. Percentage of prenatal mothers by infant feeding intention (IFI) scale and income poverty

IFI Scale	All Prenatal Mothers % (SE)	Income Poverty[b]		
		75% of Poverty Guideline or Below % (SE)	Above 75% But No More Than 130% of Poverty Guideline % (SE)	Above 130% of Poverty Guideline % (SE)
0 – 3.5	3.9 (0.6)	4.7 (0.8)	2.2 (0.6)	3.8 (1.6)
4 – 7.5	22.2 (1.3)	24.9 (1.5)	19.0 (1.7)	13.5 (2.1)
8 – 11.5	38.9 (1.3)	38.0 (1.4)	40.5 (2.2)	39.9 (4.2)
12 – 15.5	29.0 (1.5)	27.1 (1.7)	31.5 (2.7)	33.8 (3.5)
16	6.0 (0.6)	5.3 (0.7)	6.7 (1.1)	9.0 (2.2)
Unwgt n[a]	2,581	1,628	715	238
Wgt n	385,931	242,774	104,756	38,401

[a] n is less than 2649 due to item nonresponse.
[b] Chi-square statistic testing of income poverty differences is significant at $p \leq 0.05$.
Data source: Prenatal interview questions KA19a through KA19e.

Table C-4j. Percentage of prenatal mothers by infant feeding intention (IFI) scale and breastfeeding history

IFI Scale	All Prenatal Mothers % (SE)	Breastfeeding History[b]		
		No History (includes first-time mothers) % (SE)	Three or Less Months % (SE)	More Than Three Months % (SE)
0 – 3.5	3.9 (0.6)	6.3 (1.0)	2.3 (0.8)	0.7 (0.3)
4 – 7.5	22.2 (1.3)	23.0 (1.8)	28.2 (2.4)	15.5 (1.2)
8 – 11.5	38.9 (1.3)	37.3 (1.7)	45.4 (2.4)	36.5 (2.2)
12 – 15.5	29.0 (1.5)	28.2 (1.8)	21.7 (2.1)	36.5 (2.7)
16	6.0 (0.6)	5.1 (0.7)	2.4 (1.0)	10.8 (1.6)
Unwgt n[a]	2,581	1,367	546	668
Wgt n	385,931	198,849	84,583	102,499

[a] n is less than 2649 due to item nonresponse.

[b] Chi-square statistic testing of breastfeeding history differences is significant at $p \leq 0.05$.

Data source: Prenatal interview questions KA19a through KA19e.

Appendix D
Additional Analysis Details

D.1 Changes in Benefits and Barriers by Race and Ethnicity

Tables D-1 and D-2 compare how the percentages of women responding positively to benefit and barrier statements have changed by race and ethnicity between WIC IFPS-1 and WIC ITFPS-2. To facilitate comparison over time, we have color coded the relative ranking of responses within each study with rose representing the positive group, followed by teal, followed by green, and with blue representing the least positive group regarding breastfeeding.

As Table D-1 shows, in the case of benefits almost all groups are more positive about the benefits of breastfeeding than they were in WIC IFPS-1. Additionally, the relative rankings between racial/ethnic groups have remained generally the same, with Hispanics being the most positive about breastfeeding, followed by those in the "All other races" category, followed by whites, and with African Americans being the least positive.

Table D-1. Percentages of women from WIC IFPS-1 and WIC ITFPS-2 agreeing with benefit statements by race and ethnicity

	Race						Ethnicity	
	African American		White		All Other		Hispanic	
Maternal attitudes and beliefs	IFPS-1	ITFPS-2	IFPS-1	ITFPS-2	IFPS-1	ITFPS-2	IFPS-1	ITFPS-2
Breastfed babies are healthier than formula-fed babies	62	75.4	51	78.8	63	86.3	86	88.5
Breastfeeding helps protect the baby from diseases	64	74.0	76	82.4	80	85.0	93	87.9
Breastfeeding is easier than formula feeding	40	47.2	43	53.4	63	68.6	76	68.5
Breastfeeding brings a mother closer to her baby	81	84.0	75	88.4	96	90.3	93	92.8
Breastmilk alone gives a new baby all he/she needs to eat	59	66.9	69	71.5	73	74.9	86	78.0
Breastfeeding reduces the risk of a child becoming overweight	Not asked	45.0	Not asked	51.3	Not asked	51.3	Not asked	58.0
Breastfeeding helps women lose weight	42	73.8	52	74.4	52	75.3	70	78.6

Color coding provides the relative ranking of responses for each study by racial /ethnic group. Each study is coded separately with rose=highest agreement with statement, teal= second highest agreement with statements, green= third highest agreement with statements, and blue= lowest agreement with statements. Non-colored cells indicate a lack of comparison group.
Data source: Prenatal interview questions KA18a-f and KA18n.

In contrast, the views about barriers to breastfeeding do not follow a tight pattern by race or ethnicity, as shown in Table D-2. Instead, even 17 years ago in ITFP-1, the only dominant pattern

by race/ethnicity across the different barriers was that African Americans generally had the highest agreement rate with these statements. Over time, barriers to breastfeeding have lessened for all the racial/ethnic groups and African American no longer have a distinctly different pattern. In general, the changes in relative ranking over time by racial/ethnic group do not follow a systematic pattern.

Table D-2. Percentages of women from WIC IFPS-1 and WIC ITFPS-2 agreeing with barrier statements by race and ethnicity

	Race						Ethnicity	
	African American		White		All Other		Hispanic	
Maternal attitudes and beliefs	IFPS-1	ITFPS-2	IFPS-1	ITFPS-2	IFPS-1	ITFPS-2	IFPS-1	ITFPS-2
Breastfeeding ties you down	50	18.2	41	17.5	37	16.1	34	15.3
Breastfeeding takes too much time	40	15.6	30	13.8	32	16.4	39	17.3
Breastfeeding in public is not something I want to do	68	39.2	60	35.7	54	38.2	55	35.1
Breastmilk leaking onto your clothes is something I worry about	61	34.4	45	25.2	36	26.6	36	23.4
Breastfeeding is painful	50	44.4	32	41.1	33	49.6	47	45.6
Breastfeeding means no one else can feed your baby	64	55.4	35	45.6	57	60.7	58	60.3
With bottle feeding, the mother knows that the baby is getting enough to eat	75	65.0	75	68.1	72	66.1	78	63.6

Color coding provides the relative ranking of responses for each study by racial /ethnic group. Each study is coded separately with rose=lowest agreement with statement, teal= second lowest agreement with statements, green= third lowest agreement with statements, and blue=highest agreement with statements.
Data source: Prenatal interview questions KA18g-m.

D.2 People Women Seek to Talk to About Breastfeeding

Table D-3 displays the percentage of prenatal participants who spoke with various individuals about their infant feeding intentions. Most of them spoke with a husband or boyfriend, more than two-thirds spoke with people at their WIC clinic, and many discussed the issue with their mothers. In contrast, other relatives and friends were least often involved in feeding conversations. Only about half discussed the issue their doctor.

Table D-3. Influences on decision to breastfeed or formula feed

Talked to people about breastfeed or formula feed	All prenatal mothers % (SE)
Husband or boyfriend	
Yes	78.2 (1.2)
No/Not Applicable	21.8 (1.2)
Mother	
Yes	61.6 (1.4)
No/Not Applicable	38.4 (1.4)
Other relatives	
Yes	39.0 (1.1)
No/Not Applicable	61.0 (1.1)
Friends	
Yes	40.1 (1.0)
No/Not Applicable	59.9 (1.0)
People at WIC	
Yes	68.0 (1.6)
No/Not Applicable	32.0 (1.6)
Doctor	
Yes	50.7 (1.6)
No/Not Applicable	49.3 (1.6)
Unwgt n[a]	2,646
Wgt n	394,894

[a]n is the number of respondents to the last question shown in the table. For some questions, n is slightly different due to item nonresponse.
Data source: Prenatal interview questions KA22a-f.

D.3 IFI Scale Regression

Table D-4 provides IFI regression results. All are significant at the 0.05 level of significance, and all have the expected sign. For parsimony, we collapsed the parity and breastfeeding history variables from three categories to two.

Table D-4. Coefficients from regression analysis

Explanatory variable	Coefficient	t-Value
Intercept	2.6723561	3.76
Benefits scale	0.1173651	18.14
Barriers scale	-0.0470397	-6.81
Parity: Second or subsequent born compared to first born	-2.0056575	-8.96
Breastfeeding History: Some history compared to no history	1.6489865	7.24
Education: More than high school compared to high school or less	0.7286793	4.71
Mother living with father of baby	0.7328211	4.54
Spoke with more than one person about infant feeding plans compared to one or less	0.4180955	2.23
R^2	0.3395	
Denominator degrees of freedom for t-test	40	